Chapter 14
Recreation Resources

Water-enhanced and water-dependent recreational activities, such as wildlife viewing, fishing, hunting, swimming, motor boating, sailing, and windsurfing, are popular throughout California. The quality of recreation at lakes and reservoirs depends largely on surface water levels. Rafting and boating are popular activities that are often dependent on high river flows/reservoir levels for maximum enjoyment. Enjoyment of water-enhanced activities, such as picnicking and hiking, can also be related to higher water levels.

This chapter discusses the effects of the Flexible Purchase and Fixed Purchase Alternatives on recreation resources. Section 14.1 presents the affected environment/existing conditions and Section 14.2 evaluates the No Action, Flexible Purchase, and Fixed Purchase Alternatives, including comparative analysis of the alternatives and cumulative impacts.

14.1 Affected Environment/Existing Conditions

14.1.1 Area of Analysis

Effects are assessed in the Upstream from the Delta Region, Delta Region, and in the Export Service Area. This discussion focuses on the areas where EWA actions would take place (Figure 14-1):

- Upstream from the Delta Region: Lake Shasta; Little Grass Valley and Sly Creek Reservoirs; Lake Oroville; New Bullards Bar Reservoir; French Meadows and Hell Hole Reservoirs; Folsom Lake; Lake McClure; Sacramento, Feather, Yuba, American, and Merced Rivers; Waterfowl hunting areas in Glenn, Colusa, Yolo, Sutter, Butte, and Placer Counties.

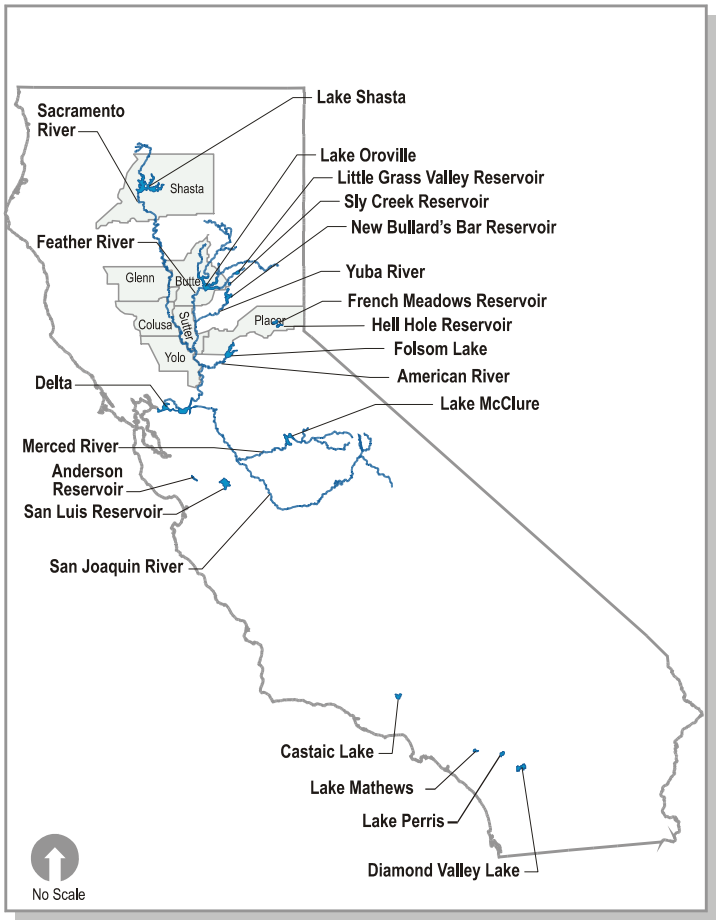


Figure 14-1
Recreation Area of Analysis

- Delta Region

- Export Service Area: Anderson Reservoir, San Luis Reservoir and O'Neill Forebay; Lake Perris; Castaic Lake; Diamond Valley Lake; Lake Mathews.

14.1.2 Upstream from the Delta Region

Major recreation areas in the Upstream from the Delta Region can be found at lakes and reservoirs, rivers and streams, federal wildlife refuges, and state wildlife management areas (WMAs). River flows and reservoir levels tend to be highest in late spring and early summer and taper off toward fall, somewhat reducing the quality or availability of recreational activities such as rafting and boating. Water-based and water-enhanced activities are more prevalent during the summer months when the air temperature is warm; however, fishing and wildlife viewing are year-round activities.

14.1.2.1 Hunting and Fishing

This discussion focuses on the types of hunting and fishing in areas where EWA actions could take place, including the reservoirs and rivers mentioned above and rice fields.

Many duck clubs are established on flooded rice fields during the winter because of the large number of waterfowl that flock to the rice fields for forage and habitat. In 2001, approximately 45,000 hunter visits to 11 sites within the EWA program area were reported by the Department of Fish and Game. Approximately two waterfowl (ducks, geese, or coots) were shot per hunter. Regulations vary by bird species; however, the hunting season generally spans from late October through January.

Reservoirs and rivers provide habitat for cold- and warm-water fish. Anglers fish for striped bass, salmon, sturgeon, steelhead, trout, Kokanee salmon, bass, crappie, bluegill, catfish, and others. The California Department of Fish and Game publishes a fishing regulation booklet each year that summarizes the allowable fishing season, take limit, and other guidelines specific to each species. Fishing is popular year-round; however, the species caught may vary during different times of the year. According to the California Department of Fish and Game, more than 2.2 million anglers purchase some type of fishing license each year.

14.1.2.2 Sacramento River

The upper Sacramento River and major upstream reservoirs (Shasta and Keswick) are important recreational resources for the Sacramento Valley and beyond. These resources support a broad range of water-dependent and water-enhanced recreation opportunities, including facilities for boating, fishing, swimming, and camping.

Fishing, rafting, canoeing, kayaking, swimming, and power boating are available along most of the upper Sacramento River. Whitewater rafting and other boating opportunities are dependent on river flows above 5,000 cubic feet per second (cfs).

Additional recreational activities along the Sacramento River include hiking, wildlife viewing, and camping.

Between Colusa and Sacramento, major recreational facilities exist at the Colusa-Sacramento River Recreation Area, Colusa Weir access, Tisdale Weir access, River Bend Boating Facility, Knights Landing, Sacramento Bypass, and Elkhorn Boating Facility. The Colusa-Sacramento River State Recreation Area provides 60 acres of riverfront recreation near the City of Colusa and contains the only public boat launch and landing facility in Colusa County. The park is at the north end of town where the river makes a wide easterly bend. Its key features are boat ramps, picnic sites, nature trails, and campsites. The river's width at the park provides room for a variety of water activities, including fishing, boating, and waterskiing.

Wildlife refuges along the Sacramento River provide fishing, hunting, and wildlife viewing opportunities. These refuges include Sacramento, Colusa, Sutter, and Delevan National Wildlife Refuges (NWRs) and Gray Lodge WMA. Gray Lodge WMA is the most popular of the five refuges in the region. Non-consumptive (photography and hiking) and consumptive (fishing and hunting) uses historically have been equally popular at the refuges, each accounting for approximately 50 percent of the total use. Sutter and Delevan NWRs are used almost exclusively for hunting.

The lower Sacramento River constitutes the reach between the American River confluence and the Delta. As a recreational resource, its use is associated closely with recreational use of Delta waterways. This lower reach of the river, influenced by tidal action like the Delta, is a popular boating and fishing area with dispersed public access, several private marinas, and extensive boat traffic, particularly in the summer.

14.1.2.2.1 Lake Shasta

The U.S. Forest Service administers Lake Shasta and Keswick Reservoir. The four large arms of Lake Shasta are the Pit River, Squaw Creek, McCloud River, and Sacramento River. Recreational facilities on Lake Shasta include 27 designated campgrounds, 4 picnic areas, 7 public boat ramps, and 11 private marina resorts. The boat ramps extend to varying elevations. For example, Bailey Cove boat ramp is available until 50 feet of drawdown occurs, whereas Jones Valley and Centimudi are available to 210 feet of drawdown. Low lake levels affect campsite accessibility before boat ramps are affected (Grigsby 2003). Recreation activities on Keswick Reservoir are primarily boating and fishing, with little development other than one boat ramp.

14.1.2.3 Feather River

Activities such as swimming, fishing, camping, bird watching, picnicking, and bicycling are popular along the Feather River. Rafting on the North and Middle Forks of the Feather River runs from January to April or May, depending on flow. Summer rafting and kayaking occurs on the North Fork depending on upstream PG&E reservoir operations, though lower flows in these reaches allows recreationists to use inner tubes to float down the river. The section of the Feather River between the

Thermalito Diversion Dam and Thermalito Afterbay outlet is commonly referred to as the Low Flow Channel of the Feather River (Figure 14-2). Fishermen, wildlife and birdwatchers, sightseers, hikers, and bicyclists enjoy recreation along the Low Flow Channel. The Brad P. Freeman Trail runs beside this section of river from the Diversion Dam to Highway 162. This section is an important recreational resource for the residents of Oroville and nearby areas. Based on California Department of Fish and Game regulations, the river is open for fishing north of the Table Mountain Bicycle Bridge. In the spring and fall, salmon are known to congregate at the Thermalito Afterbay outlet. In recent years, the Feather River has served as habitat to 40,000 Chinook salmon in the spring and fall. Downstream from the Thermalito Afterbay outlet, the river continues through the Oroville Wildlife Area. The Oroville Wildlife Area provides opportunities for bird watching, in-season hunting, fishing, swimming, and camping.

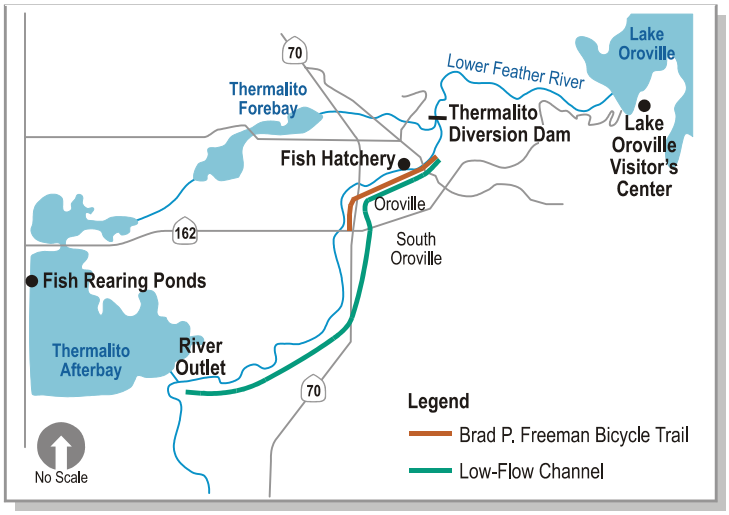


Figure 14-2
Lake Oroville and Vicinity

14.1.2.3.1 Little Grass Valley and Sly Creek Reservoirs

Little Grass Valley Recreation Area in the Plumas National Forest offers recreationists a wide variety of outdoor experiences, including camping, picnicking, fishing, waterskiing, swimming, boating, hunting, hiking, sightseeing, and winter sports such as snowmobiling and cross-country skiing. Camping is provided at Running Deer, Red Feather, Little Beaver, Wyandotte, Peninsula Tent, and Black Rock Campgrounds. Boat ramps include Maidu, Tooms, and Black Rock. The Maidu boat ramp is above water and usable when the reservoir is above 50,000 acre-feet. Tooms and Black Rock boat ramps are operable when reservoir levels are above 55,000 acre-feet (DWR 2000). Low reservoir levels affect use of boat ramps prior to affects on swimming beaches or campgrounds (Humphreys 2003). Blue Water and Pancake Beaches provide changing pavilions, restrooms, and parking. Trout varieties in the lake include brown and rainbow trout. Catfish and other warmwater species are also present.

Sly Creek Reservoir is in eastern Butte County, 35 miles east of Oroville. Recreation at Sly Creek Reservoir includes camping, hiking, picnicking, swimming, fishing, and boating. Mooreville boat ramp provides access to the reservoir and remains operable while water levels are above elevation 3,479 feet mean sea level (msl). The reservoir is managed to maintain elevations above 3,480 through July (Braxton 2002). Low

reservoir levels affect use of boat ramps prior to affects on swimming beaches or campgrounds (Humphreys 2003). The California Department of Fish and Game regularly stocks the reservoir with fish, including rainbow trout, brown trout, and Kokanee. Sly Creek and Strawberry campgrounds have a combined total of 40 campsites. These campgrounds were developed by Oroville Wyandotte Irrigation District (ID) and are operated by a Plumas National Forest concessionaire.

14.1.2.3.2 Lake Oroville

Lake Oroville is the second largest reservoir in California and is the keystone of the SWP. Lake Oroville, Thermalito Diversion Pool, Thermalito Forebay, Thermalito Afterbay, and the Oroville Wildlife Area all compose the Lake Oroville Complex that distributes water and electrical power to various destinations. Lake Oroville has two full-service marinas; nine parks provide facilities for baseball, tennis, swimming, and picnicking within the lake's vicinity. Figure 14-3 shows the major recreational areas and facilities at Lake Oroville. There are major boat launch ramps at Bidwell Canyon, Loafer Creek, and Lime Saddle (DWR 2001). The Spillway has an 8-lane and a 12-lane ramp in two stages. New extensions constructed in 2002 on boat ramps at Bidwell Canyon, the Spillway, and Lime Saddle allow the ramps to remain open when lake elevations remain above 700 feet msl (Knox 2003). Average water surface elevation in Lake Oroville has historically been between 817 feet msl and 787 feet msl between July and September, respectively. Although boat ramps remain usable, lower lake elevations can adversely affect swimming beaches and boat in campgrounds (Sherman 2003). The Lake Oroville State Recreation Area provides camping, picnicking, boating, fishing, hunting, horseback riding, hiking, bicycling, sightseeing, and a variety of other activities. Major facilities in the State Recreation Area include Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, Lake Oroville Visitor Center, and North and South Themalito Forebay. Additionally, the Recreation Area provides several less-developed car-top launching areas, 84 boat-in campsites, and 10 floating campsites on Lake Oroville. Nearby, DWR maintains three launch ramps and a day-use area at the Oroville Wildlife Area, which includes Thermalito Afterbay.

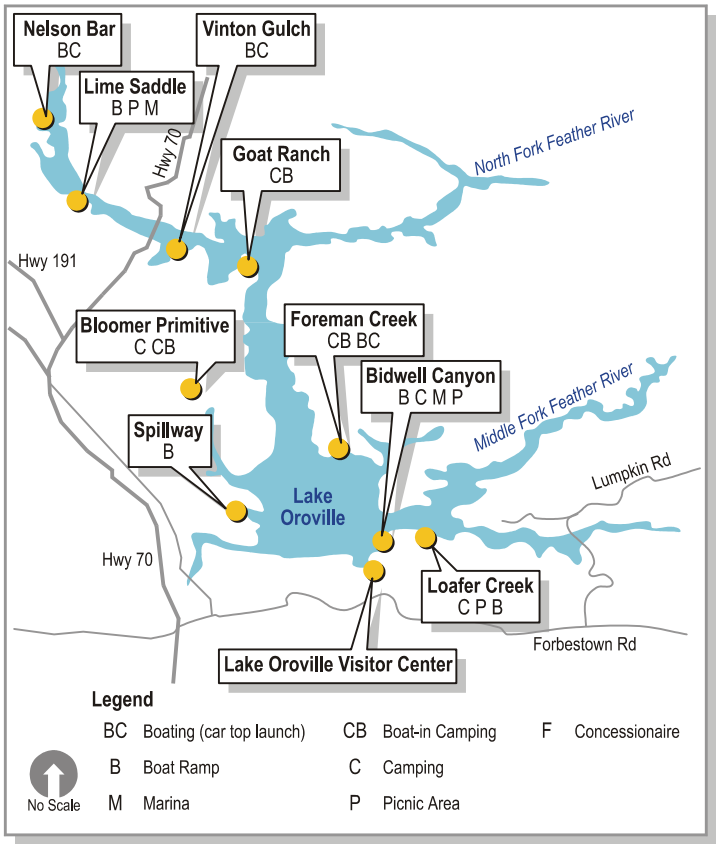


Figure 14-3
Major Recreational Areas at Lake Oroville

Water levels affect recreational opportunities. As water levels decrease, opportunities for operable boat launch ramps, car-top boat launches, swim beaches, and boat-in camps can decrease. Low water levels also impair boat access to Feather Falls, a spectacular attraction on the Fall River, a Feather River tributary.

14.1.2.4 Yuba River

Numerous rivers, creeks, tributaries, and reservoirs along the Yuba River offer recreation opportunities and receive extensive use. Boating in the Yuba River is limited because of poor access; boats must be hand-carried to the river. Where access is available, fishing, picnicking, rafting, tubing, and swimming are the dominant recreational uses. The Yuba River offers excellent American shad, Chinook salmon, and steelhead fishing.

14.1.2.4.1 New Bullards Bar Reservoir

New Bullards Bar Reservoir is approximately 21 miles north of Nevada City, in historic gold country. This reservoir is popular for boating, fishing, and camping. Over 20 miles of hiking and mountain biking trails exist in the area, including Bullards Bar Trail, which runs along the perimeter of the lake. Several campgrounds, including Schoolhouse and Dark Day, are in the vicinity. Some campgrounds around the reservoir, such as Madrone Cove and Garden Point, are accessible by boat only. Emerald Cove Resort and Marina is a floating marina that is operable at all lake levels. The marina offers a general store, pumping station, launch ramp, boat rentals, moorage, and annual slips. Boat access to the reservoir is provided by the Cottage Creek boat ramp (at Emerald Cove Marina) and Dark Day boat ramp. Cottage Creek boat ramp is unusable when the lake level falls below 1,822 feet mean sea level (msl), and Dark Day boat ramp becomes inoperable when the lake level falls below 1,798 feet msl (Onken 2003). Low reservoir levels affect day swimming areas and boat in campgrounds before boat ramps are affected. Fish species found in the reservoir include rainbow trout, brown trout, Kokanee salmon, smallmouth bass, largemouth bass, bluegill, crappie, and bullhead catfish. Some boat launchings occur year round; however, the typical boating season extends from about early May through mid October. The heaviest use of the ramps occurs on weekends and holidays from Memorial Day to Labor Day (U.S.D.A Forest Service 1999).

The Tahoe and Plumas National Forests total more than 56,000 acres of land in the Yuba River watershed. The forests offer hunting, fishing, camping, hiking, and other recreational opportunities. The 11,200-acre Spenceville Wildlife Area, managed by the California Department of Fish and Game, provides picnicking, fishing, hunting, and hiking.

14.1.2.5 American River

On the Middle Fork of the American River, commercial rafting is available upstream from the confluence of the North and Middle Forks. The minimum threshold for whitewater boating is 850 cfs (EDAW and SWRI 1999).

Recreation facilities on the lower American River are generally along the American River Parkway. The lower American River is the focus of the parkway that extends from Nimbus Dam to Discovery Park. The parkway consists of 14 interconnected parks, a continuous trail system, and contains 5,000 acres**.** The parkway is recognized as one of the Nation's premiere urban parkways (PCWA 2001). The most popular feature is the Jedediah Smith Memorial Bicycle Trail that extends approximately 32 miles from Discovery Park on the lower American River to Beal's Point at Folsom Reservoir.

Additional recreation facilities include pedestrian/equestrian trails and picnic areas throughout the parkway. Water-dependent facilities consist primarily of trailered-boat and car-top boat launching facilities. Fishing is permitted in the parkway year round except during fall and early winter, when portions of the river are closed to protect spawning fish. The parkway contains no commercial recreation facilities, although raft rental outfitters are located nearby. The boating and rafting season is generally between April and October, with peak raft rentals in June, July (highest use month), and August (PCWA 2001). The minimum/maximum flow range for adequate whitewater rafting and boating opportunities on the lower American River is 1,750 cfs to 6,000 cfs. The optimum range is slightly higher, 3,000 cfs to 6,000 cfs (EDAW and SWRI 1999). Owned and managed by the County of Sacramento, the parkway is linked to additional parklands from Nimbus Dam to Folsom Reservoir. The California Department of Parks and Recreation manages the latter parklands.

14.1.2.5.1 French Meadows and Hell Hole Reservoirs

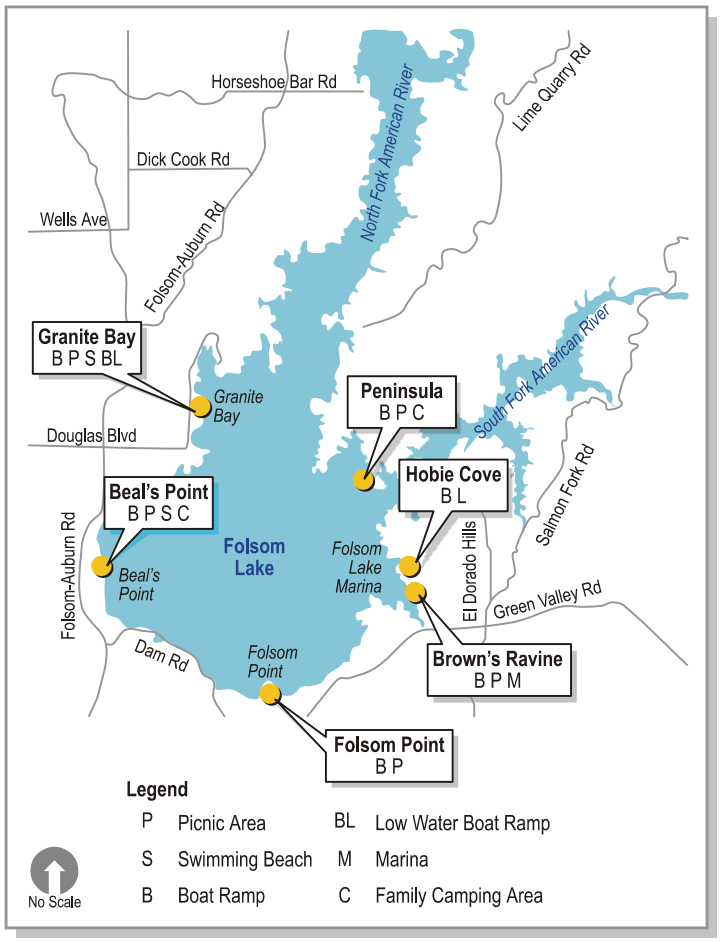
French Meadows Reservoir, which is on the Middle Fork of the American River, provides recreation opportunities for camping, boating, picnicking, horseback riding, and hiking. The reservoir provides boat access via two launch sites. The boat ramps become unusable when the storage drops below elevation 5,196 feet (Neary 2002). Low water levels affect boat ramps before beaches or boat-in campgrounds (Hill 2003). Fishing for rainbow and brown trout is a popular activity.

Hell Hole Reservoir is in the Eldorado National Forest on the Rubicon River, a tributary of the American River. The primary recreation activities on this reservoir are camping and fishing; a variety of trout are available in the lake. One boat launch ramp suitable for small craft is accessible when storage in the reservoir is above elevation 4,537 feet (Jones and Stokes 2001). Fifteen boat access sites (for small craft) are also available on the lake. Low water levels affect boat-in campgrounds before boat ramps are affected (Jue 2003).

14.1.2.5.2 Folsom Lake

Folsom Lake is in the Folsom Lake SRA, which is managed by the California Department Parks and Recreation. When full, Folsom Lake has about 11,900 surface-acres of water and extends nearly 15 miles up the North Fork of the American River and 10.5 miles up the South Fork. Folsom Lake has 75 miles of undeveloped shoreline, including many areas available for swimming. Summer surface water temperatures

are warmer than inflowing water or water released downstream to Lake Natoma, so the surface water becomes warm enough for comfortable swimming.



Source: EDAW and SWRI 1999

Figure 14-4
Folsom Lake SRA Facilities

Folsom Lake has recreation facilities for boat launching, mooring, swimming, hiking, bicycling, picnicking, camping, fishing, and nature study (Figure 14-4). A majority of the water-dependent recreational facilities are at Beal's Point, Granite Bay, Peninsula Campground, Brown's Ravine, and Folsom Point (formerly Dike 8). Approximately 80 miles of trails are available for hiking and horseback riding, including an 8-mile paved bicycle trail that connects with the American River Parkway's 26-mile Jedediah Smith Bicycle Trail (see below). Also of note is the 7.7 mile Darrington Mountain Bike Trail that follows the Folsom Lake shoreline from the South Fork of the American River to the Peninsula Campground.

The primary commercial recreational facility on Folsom Lake is the Folsom Lake Marina in Brown's Ravine. The only marina on the lake, Folsom Lake Marina provides approximately 685 wet slips and 45 dry slips for both sailboats and powerboats. The wet slips are operable when the lake level is at least 412 feet msl elevation (PCWA 2001). The slips can accommodate boats up to 28 feet in length. Small craft rental and supplies are also available at the marina. In addition, concessionaires operate snack bars and recreational equipment rentals at the Beal's Point and Granite Bay swimming beaches during the peak summer season.

The water surface elevation in Folsom Lake affects the availability of boat ramps, beaches, berth sites, and other facilities that depend largely on water depth or surface

area. Boat ramps and swimming beaches are affected simultaneously as water levels recede (Nakaji 2003).

14.1.2.6 Merced River

Recreational opportunities along the river are very limited (Stillwater Sciences and EDAW 2001). Most parks and recreation spots are located within agricultural and grazing land areas. Two percent of the land area in the Merced River corridor is publicly owned, although much of this land does not offer recreational opportunities or public access to the river (Stillwater Sciences 2002). There are five parks and public access points downstream from Crocker-Huffman Dam to the confluence with the San Joaquin River, Cuneo Fishing Access, Henderson County Park, McConnell SRA, Hagaman County Park, and George Hatfield SRA. Recreational opportunities at these parks include boating, canoeing, rafting, fishing, swimming, camping, and picnicking. Most of these activities occur primarily during the summer, typically May through September.

14.1.2.6.1 Lake McClure

Lake McClure offers boating and waterskiing, camping, fishing, and hiking. Barrett Cove Marina on Lake McClure is the largest recreational facility on the lake. It has year-round houseboat and patio boat rentals as well as rentals for other watercraft. McClure Point overlooks the largest span of Lake McClure, offering many water sports and activities. There is one boat ramp at McClure Point, two boat ramps at Barrett Cove, and one boat ramp at both Horseshoe Bend and Bagby recreation area. The boat ramps at lake McClure cease operation when the reservoir reaches elevation 793 feet (Bagby); 758 feet (Horseshoe Bend); 650 feet (McClure Point); 630 feet (southern Barrett Cove); 590 feet (northern Barrett Cove and Piney Creek) (San Joaquin River Group 1999). Low water levels affect boat ramps before swimming beaches (Latronica 2003).

14.1.3 Delta

Boating, hunting, sport fishing, and other water-based activities are the most important recreational activities in the Delta. The facilities available to boaters and other recreational users include marinas, city or county public access areas, and yacht or ski clubs. The increasing demand for Delta recreation opportunities spurred the state to establish Brannan Island SRA in 1965 and Franks Tract SRA in 1966.

Historically, year-round sport fishing from shore locations, piers, and boats has been a major activity in the Delta. According to the Delta Protection Commission, sport fishing tournaments are an important recreational activity that contribute to the local economy. Important sport fishing species include striped bass, shad, black bass, catfish, salmon, and steelhead.

Most of the navigable waterways in the Delta are public, and most of the land is private. The lack of public lands limits the use of the Delta for recreation. Public use of the Delta is concentrated in a few areas where marinas and other facilities provide recreational opportunities and access to the Delta waterways and at roadside areas

where public roads are adjacent to the waterways. There are few public parks. Some of the recreation areas in the Delta are accessible only by boat, thus limiting access to the Delta for some users, such as shore anglers.

About 120 marinas account for most of the recreational facilities in the Delta. In addition to berthing and boat fuel, marinas provide services including ski boat and houseboat rentals; boat services (such as boat launching) and marine supplies; camping and picnicking facilities; guest docks; and food and beverage services. Marinas are not equally distributed throughout the Delta but are concentrated in a handful of locations. The most heavily used areas include Bethel Island in Contra Costa County and Lower Andrus Island in Sacramento County. Bethel Island is very congested, with resorts and 33 marinas providing 1,185 berths. In addition to marina berths, the private facilities at Bethel Island include a large number of support and service facilities. Andrus Island is more rural but provides nearly 1,700 berths.

Popular access points for boating, waterskiing, and riding personal watercraft include Windmill Cove near SR 4; King Island; Paradise Point; Herman & Helens near Eight Mile Road; Tower Park near SR 12; and Del's Boat Harbor near the city of Tracy. Houseboating also is concentrated along Eight Mile Road. Windsurfing, a popular sport in the Delta, typically occurs along SR 160 between Sherman Island and Rio Vista and at Windy Cove. Windy Cove is a new facility constructed at Brannan Island SRA and is the only formal windsurfing site in the area.

Not all recreational activities in the Delta are associated with water. The more popular land-based recreation activities include hunting, camping, picnicking, walking for pleasure, bicycling, wildlife viewing, photographing wildlife, sightseeing (driving for pleasure), and attending special events. Waterfowl and pheasant are hunted at wildlife management areas including Grizzly Island, Joice Island, and Sherman Island, in addition to a variety of state cooperative hunting areas.

Much of the open space in the Delta is used for public parks and wildlife refuges. The California Department of Parks and Recreation owns 5,000 acres in the Delta, including Brannan Island, Franks Tract (flooded), Delta Meadows (a scenic waterway near Locke that is popular with boaters), and over 1,000 acres in the Stone Lakes NWR. State, Federal, and nonprofit agencies have purchased significant acreage in the Delta in recent years for enhancement and management as wildlife habitat. For example, California Department of Fish and Game owns 8,080 acres of land in the Delta, including underwater land in the Lower Sherman Island Wildlife Area, portions of the Yolo Bypass, Woodbridge Ecological Reserve, Calhoun Cut Ecological Reserve, and Webb Tract berms and islands.

14.1.4 Export Service Area

14.1.4.1 Anderson Reservoir

Santa Clara Valley Water District leases Anderson Reservoir to the Santa Clara County Parks and Recreation Department who maintain jurisdiction over the Anderson Reservoir County Park. The provisions of the lease provide the District

flexibility to operate Anderson Reservoir. District Resolution 605 establishes a minimum summer pool of 20,000 acre-feet for recreation. Anderson Lake Park has power and non-power boating, water skiing, picnic areas, and barbeque facilities. The 2,365-acre park also includes Coyote Creek multiple use trails, Jackson Ranch historic park site, Moses L. Rosendin Park, and the Burnett Park area. A new 60-foot wide, four-lane boat launch ramp (scheduled for completion in the fall of 2003) will replace the original boat ramp built in the mid-1950s.

14.1.4.2 San Luis Reservoir

San Luis Reservoir and O'Neill Forebay provide for activities such as boating, waterskiing, fishing, camping, and picnicking. San Luis Reservoir SRA is open year round. Boat access is available via one boat ramp at the Basalt area at the southeastern portion of the reservoir and at Dinosaur Point at the northwestern portion of the reservoir. The boat ramp at Basalt becomes difficult to use because of low reservoir levels at elevation 340 feet; the boat ramp at Dinosaur Point is difficult to access at elevation 360 feet (San Joaquin River Group 1999). There are no designated swimming areas or beaches at San Luis Reservoir, but O'Neill Forebay (with its stable surface elevation) has popular swimming, boating, fishing, and camping opportunities.

14.1.4.3 Lake Mathews

Lake Mathews is in Riverside County between Interstate 15 and Interstate 215. Metropolitan Water District (WD) completed Lake Mathews Reservoir in 1939 as the western terminus for the Colorado River Aqueduct. The Lake Mathews – Estelle Mountain Reserve, approximately 13,000 acres, surrounds the lake and is managed jointly by Metropolitan WD, the Riverside County Habitat Conservation Agency, U.S. Bureau of Land Management, and the California Department of Fish and Game. Public access on the Reserve is permitted only on non-Metropolitan WD lands and only by foot or horse travel; there is no public recreation on the lake.

14.1.4.4 Castaic Lake

Castaic Lake is in the Castaic Mountains in southern California and has 29 miles of shoreline. Castaic Lake and Lagoon provide many opportunities for recreation. With two boat launch ramps, the upper lake offers visitors a wide range of water sports, such as sailing, waterskiing, powerboating, and fishing. The east ramp is usable (above water) when the surface elevation is above elevation 1,325 feet msl. The west ramp becomes unusable earlier, at surface elevation 1,435 ft msl (Leahigh 2002). Table 14-1 lists potential recreation effects caused by low water levels that occur in many years. Castaic Lake supports largemouth bass, bluegill, trout, crappie, and catfish. Castaic Lagoon, south of Castaic Lake, serves as a recreation area and a groundwater recharge basin. Overnight camping is available at the lagoon, which features sandy beaches, grassy picnic areas, and a two-lane boat launching ramp. Boating in Castaic Lagoon is limited to non-power boats only; sailing, canoeing, and fishing are popular activities in this area.

Table 14-1 Potential Recreation Effects at Castaic Lake State Recreation Area due to Changes in Surface Water Level	
Lake Surface Water Level (feet)	**Potential Effects**
1,515	Maximum operating surface elevation.
1,495	Potential for significant propeller damage to boats from exposed hazards begins and increases rapidly as the water elevation drops farther.
1,490	Two of the largest boat-in picnic areas on the lake, Sharon's Rest and Laura's Landing, become inaccessible unless willing to climb very steep shoreline.
1,480	Surface area of the lake is decreased by over 10 percent. Existing conflicts between user groups during heavy use periods would be exacerbated. Waiting lines for launching, which frequently occur during heavy use periods even at full lake capacity, would increase.
1,460	The west boat launch ramp loses two of its six lanes.
1,456	Of approximately 25 mapped lake hazards, half would be exposed. Hazard areas are to be avoided when water levels are within 5 vertical feet of hazard elevation.
1,450	The east (main) launch ramp begins to lose lanes, adversely affecting concessionaire's rental boat operation.
1,435	The west boat launch ramp becomes completely unusable. Additional pressure is placed on the main launch ramp and the potential for waiting lines for launching boats is greatly increased.
1,428	Approximately 75 percent of lake hazard areas would be exposed.
1,280	Minimum operating surface elevation.
1,280	Dead pool surface elevation.

Source: Central Coast Water Authority 1995

14.1.4.5 Lake Perris

Lake Perris is southeast of Los Angeles and is the southern terminus for the State Water Project's East Branch of the California Aqueduct. The lake has 10 miles of shoreline that provides opportunities for swimming, boating, fishing, picnicking, bicycling, horse riding, waterskiing, scuba diving, rock climbing, and hunting. Elevations of the boat ramps on the lake are listed in Table 14-2.

Table 14-2 ***Lake Perris Boat Ramps***	
Boat Ramp	***Elevation (ft above msl)***
Ramps 1-4	No record
Ramp 5	1,554
Ramp 6	1,535
Ramp 7	1,566
Power Cove	1,579

Source (Leahigh 2002)

Swimming and playground facilities are available at the Moreno and Perris beaches. The Bernasconi Pass area has picnic facilities and camping sites. The "Big Rock" rock climbing area is also in this vicinity. Fish species in the lake include rainbow trout,

catfish, and Alabama spotted bass. The Lake Perris area also offers hunting for such upland game as valley quail, mourning dove, ducks, geese, and rabbits.

Stakeholders established a task force to manage needs regarding water supply, level, quality, and use at Lake Perris. Maintaining water levels to provide for adequate recreational opportunities was a priority for the Department of Parks and Recreation. The Department of Fish and Game, Riverside County Department of Health, Department of Water Resources, Metropolitan Water District, and the California Department of Boating and Waterways also have priorities for management of water coming into and out of Lake Perris. When water levels are low, recreational opportunities (such as for boating) can be reduced. Normal operations can trigger these low water levels. Also, water quality concerns arising from low water levels affects permitted use of the lake (Arroyo 2002). Table 14-3 lists potential recreation effects caused by low water levels.

Table 14-3 Potential Recreation Effects at Lake Perris State Recreation Area Due to Changes in Surface Water Level

Lake Surface Water Level (feet)	Potential Effects
1,588	Maximum operating surface elevation.
1,574	Guest boat slips at marina would not be usable.
1,573	Non-guest boat slips at marina would not be usable. Exposed hazards would begin to cause potential vessel damage. Increased safety risks to boating public and personal watercraft from reduced surface area and increased hazards.
1,570	Watercraft and windsurfing would be adversely affected as mud and silt layers are within the wading zone where users access the beach for launching. Swimming would be adversely affected by reduced aesthetics, odor, and unpleasant beach conditions, due to exposure of wading zone. Hazards from exposed clam bed and vegetation. Habitat and cover would be exposed and begin to affect sportfishing. Shore fishing would be affected due to increased difficulty of accessing the lake.
1,565	Exposure of numerous underwater hazards would result in 50 percent reduction in the area available for waterskiing and the recreational use of personal watercraft.
1,560	Launch ramp exposed. Most boat-in facilities would be unusable due to exposed mud, underwater vegetation, and hazards. Use conflicts would be significantly increased. Normal operating capacity of 500 vessels would be decreased due to reduced water surface area. Boater delays, which are currently up to four hours or more on weekends during May through October, would be increased.
1,544	Water intake for park's domestic water supply would become inoperable, affecting both park users and employees' residences.
1,540	Minimum operating surface elevation.
1,500	Dead pool surface elevation.

Source: Central Coast Water Authority 1995

14.1.4.6 Diamond Valley Lake

Diamond Valley Lake is between Temecula and Hemet and spans 4.5 miles. The lake has recently been filled; recreation facilities have not yet been constructed. Recreation may eventually include opportunities for biking, hiking, camping, fishing, sailing, boating, and golfing. Facilities at Diamond Valley Lake will likely also include special event areas and separate swimming pools and lagoons.

14.2 Environmental Consequences/Environmental Impacts

14.2.1 Assessment Methods

Under each alternative, the EWA Project Agencies would negotiate contracts with willing sellers based on a number of factors, including price, water availability, and location. These factors would change from year-to-year; therefore, the EWA Project Agencies may choose to vary their acquisition strategy in each year. Maximum flexibility is provided by including in this analysis many potential transfers when the EWA Project Agencies would likely not need all transfers in a given year. Chapter 2 defines the transfers that are included in this analysis.

The effects analysis uses both quantitative and qualitative methods to assess changes in recreational opportunities and use of affected facilities. Quantitative methods include consideration of thresholds at which recreational opportunities are affected (e.g., the reservoir level at which boat ramp use declines or boat ramps become unusable). The comparison of reservoir storage elevations and river flows uses median values over the period of record and current operating parameters as a baseline. This method supplies the most average result; 50 percent of the time actual reservoir and river levels will be higher and 50 percent of the time the actual levels will be lower than those used in the baseline. If the reservoir and river levels differ greatly from the historic level during a transfer year, the effects will also differ from those predicted by the analysis. If reservoir levels are higher than the historical average, the actual effects will be less than the predicted effects. If reservoir levels are lower than the historical average, the actual effects will be greater than the predicted effects. Attachment 1 describes the modeling efforts to quantify changes in reservoir storage, riverflows, and river temperatures. Qualitative methods used to assess recreation effects include consideration of potential effects on the availability, accessibility, and quality of recreation sites.

For each EWA action evaluated, the maximum amount of acre-feet that would potentially be transferred was analyzed. If there were no significant effects at this maximum amount, it is assumed that a transfer of less water would also produce no significant effects.

14.2.2 Significance Criteria

EWA actions would result in a potentially significant adverse effect on recreational resources if recreational opportunities at affected facilities were substantially reduced.

The criteria below are consistent with the CALFED Programmatic Environmental Impact Statement/Environmental Impact Report. An impact on a recreational resource was potentially significant if implementing an action would cause:

- Changes in reservoir water levels or river flows that result in a substantial reduction of recreational opportunities;
- Changes of river temperature that reduce recreational swimming, tubing, canoeing, kayaking, and rafting; or
- Changes in fish and wildlife populations that would reduce recreation opportunities.

Recreational opportunities at reservoirs are affected if reservoir levels decline such that boat ramps become unusable. Boat ramp usability is chosen as the limiting factor because it is a quantifiable measurement and lower reservoir levels would generally affect boat ramps prior to affecting other recreational activities (e.g., swimming or fishing). If boat ramps remain usable, it is assumed that there are sufficient water levels in the reservoir to sustain all other recreational activities. In those cases where boat ramp usability is not a good indicator of ability to use other recreational facilities, a qualitative discussion follows.

14.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

The analysis of the recreational facilities during the assessment period (Stage 1 phase of CALFED) indicated that there would be no changes in recreational opportunities from that described in the affected environment section, with the exception of the completion of Diamond Valley Lake. Once completed, this reservoir would supply additional recreational opportunities above those described in the affected environment section. No other changes to recreation are anticipated, including construction of new facilities or the removal of existing facilities. The reliability of water supply would be as it was without the EWA. The potential for the CVP/SWP to receive less water, and as a result reservoirs in the Export Service Area to receive less water, would remain. Any effects on recreation of lowered reservoir levels would be the same in the future. Therefore, the No Action/No Project Alternative reflects the affected environment description and both are termed Baseline Condition in the following sections.

14.2.4 Environmental Consequences/Environmental Impacts of the Flexible Purchase Alternative

The Flexible Purchase Alternative allows transfers up to 600,000 acre-feet and does not specify transfer limits from the Upstream from the Delta Region or the Export Service Area. Transfers from the Upstream from the Delta Region would range from 50,000 to 600,000 acre-feet, limited by hydrologic year and conveyance capacity through the Delta. Although all potential transfers would not occur in one year, this

section discusses all transfers (a transfer amount that would result in greater than 600,000 acre-feet) to provide an effect analysis of a maximum transfer scenario. Similarly, the evaluation includes an analysis of up to 540,000 acre-feet in the Export Service Area to cover a maximum transfer scenario for that region.

14.2.4.1 Upstream from the Delta Region

14.2.4.1.1 Hunting and Fishing

EWA acquisition of water in the Upstream from the Delta Region could alter the locations of hunting areas. Rice fields that are flooded during the winter provide habitat for waterfowl and therefore are common hunting areas. If rice acreage is idled, waterfowl may be found on different fields than previous years; therefore, hunters would need to travel to different locations. As stated in Chapter 10, waterfowl populations would not decrease. Birds may flock to different fields, but the total number of birds and, therefore, the population from which to hunt from, would not decrease. Although hunting locations would change, hunting opportunities would stay the same; therefore, the effect on recreation from idling rice fields would be less than significant.

EWA acquisition of water would change reservoir levels and river flows, potentially affecting fishing opportunities. Fishing in reservoirs and rivers is a popular recreational activity. The timing, flow, and volume changes that would occur in reservoirs and rivers would not affect fish populations (see Chapter 9). Because the same number of fish would be present under the Flexible Purchase Alternative compared to the Baseline Condition, there would be no effects on recreational fishing opportunities due to a decrease in fish population.

14.2.4.1.2 Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would decrease Sacramento River flows from Lake Shasta downstream to the point of diversion in June[1]. EWA acquisition of up to 120,000 acre-feet of water via groundwater substitution and up to 158,000 acre-feet from crop idling would decrease Sacramento River flows by 1,160 cfs in June. The reduction from 18,180 cfs to 17,020 cfs in June would not affect rafting or boating, which have a minimum threshold of 5,000 cfs. Thus, the decrease in median monthly flows during June is less than significant.

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change Sacramento River flows downstream from Lake Shasta in April through September. EWA acquisition of up to 120,000 acre-feet of water via groundwater substitution and up to 158,000 acre-feet from crop idling would increase Sacramento River flows by 240 cfs between Lake Shasta and the point of diversion in July. Flows in this reach would decrease 133 cfs and 111 cfs in August and September, respectively. Downstream from the diversion point, flows would increase by 289 cfs,

[1] Because of flow and temperature requirements in the Sacramento River, Lake Shasta would not be able to store EWA water from groundwater substitution and crop idling in April and May. During these months, flows in the Sacramento River would be the same as under the Baseline Condition. In some years, (depending on hydrologic conditions) Lake Shasta would store EWA water in June.

372 cfs, 429 cfs, 1,940 cfs, 777 cfs, and 157 cfs in April through September, respectively. This represents a 1 to 11 percent increase in flow. Such an incremental increase in flow is not associated with any reduction in recreational opportunities. The increases would not preclude any recreational activity (e.g., fishing, boating, or swimming) that occurred under the Baseline Condition. The flow increase would therefore have a less-than-significant effect on recreation along the Sacramento River.

The decrease in water released from Lake Shasta in June and the subsequent increase in water released July through September would not affect Sacramento River water temperature (see Table 14-4). Because there is no change in water temperature under the Flexible Purchase Alternative, there would be no temperature-related effect upon recreational users.

Table 14-4
Long-term Average Water Temperature in the Sacramento River below Keswick Dam Under the Baseline Condition and Flexible Purchase Alternative

Month	Water Temperature[1] (degrees F)		
	Baseline	Flexible Purchase Alt.	Difference
Oct	50.7	50.7	0.0
Nov	50.9	50.9	0.0
Dec	48.8	48.8	0.0
Jan	45.4	45.4	0.0
Feb	47.9	47.9	0.0
Mar	51.3	51.3	0.0
Apr	51.0	51.0	0.0
May	47.9	47.9	0.0
Jun	47.4	47.4	0.0
Jul	48.6	48.6	0.0
Aug	51.4	51.4	0.0
Sep	50.6	50.6	0.0

[1] Based on 69 years modeled.

Lake Shasta

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change the timing of releases from Lake Shasta. Lake Shasta would hold back at most 68,900 acre-feet that would have been released under the Baseline Condition. The lake level would decline faster in July and August compared to the Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September (Figure 14-5). Lake Shasta elevation would be 1.1 feet lower in July, 0.5 of a foot lower in August, and equal to the Baseline Condition in September. The small change in elevation would not affect Bailey Cove boat ramp, which is available up to 50 feet of drawdown or Jones Valley and Centimudi, which are available up to 210 feet of drawdown. At Lake Shasta, low water levels affect campsites before boat ramps. Because the lake level decline is minimal however, access to campsites would not be adversely affected. The lower elevation in July and August would not adversely affect

recreational opportunities at the lake; therefore, the effect of this action would be less than significant.

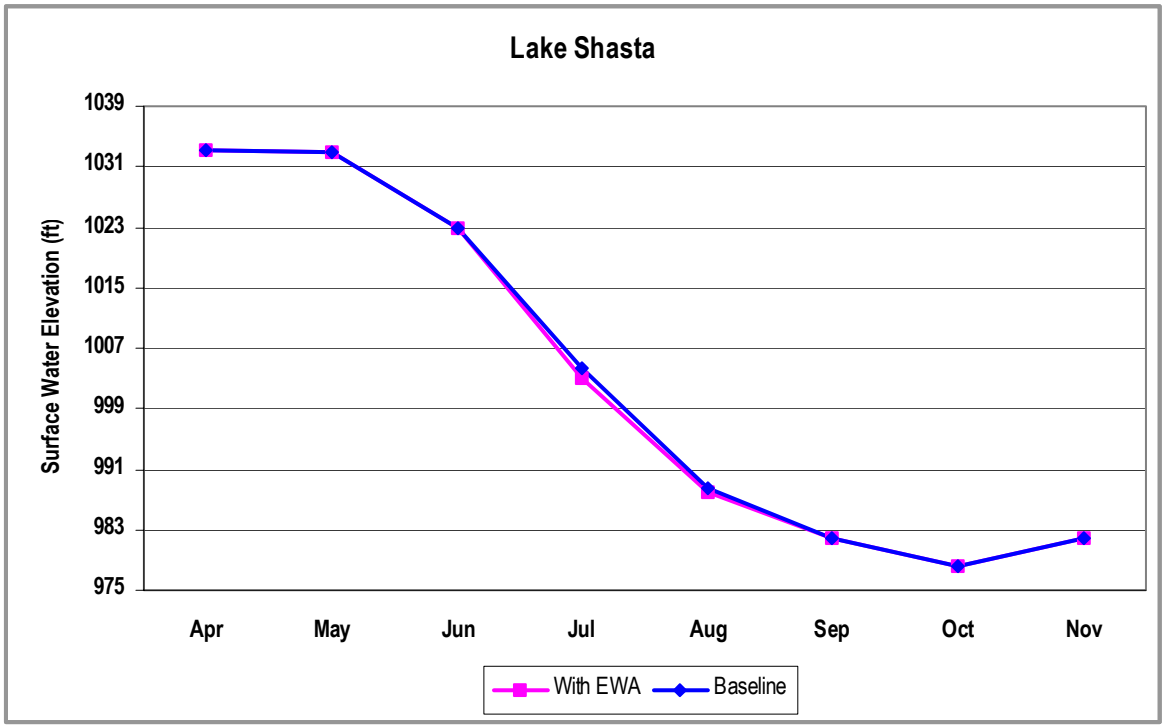


Figure 14-5
Changes in End of Month Surface Water Elevation in Lake Shasta

14.2.4.1.3 Feather River

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase Feather River flows in July through September. In July through September, the Feather River would increase below the point of diversion by 2,105 cfs, 850 cfs, and 149 cfs in July, August, and September, respectively. This is an increase above the median monthly flow under the Baseline Condition of 36 percent, 19 percent, and 9 percent in July through September. The change in flow would not affect river temperature as shown in Table 14-5. The increase in flow because of increased releases is not associated with any reduction in recreational opportunities. The increases would not preclude any recreational activity (e.g., fishing, boating, or swimming) that occurred under the Baseline Condition. The flow increase would therefore have a less-than-significant effect on recreation along the Feather River.

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would increase Feather River flows below Sly Creek and Little Grass Valley Reservoirs to Lake Oroville in November and December. The water released from Little Grass Valley and Sly Creek Reservoirs into Lake Oroville would not affect Feather River water temperature. Water released from the reservoirs would get diverted through Woodleaf and Forbestown tunnels to

run through the corresponding power generation facilities and end up in Ponderosa Reservoir. Transfer water spills from Ponderosa Reservoir directly into Lake Oroville. Because the water transferred from Little Grass Valley and Sly Creek Reservoirs into Lake Oroville would almost entirely bypass the Feather River, there would be no temperature effects on recreation.

Table 14-5. Long-term Average Water Temperature in the Feather River below Thermalito Afterbay Under the Baseline Condition and Flexible Purchase Alterative

Month	Water Temperature[1] (degrees F)		
	Baseline	Flexible Purchase Alternative	Difference
Oct	59.6	59.6	0
Nov	53.0	53.0	0
Dec	46.4	46.4	0
Jan	45.3	45.3	0
Feb	49.0	49.0	0
Mar	52.7	52.7	0
Apr	57.0	57.0	0
May	62.4	62.4	0
Jun	66.2	66.2	0
Jul	70.1	70.1	0
Aug	69.2	69.2	0
Sep	64.7	64.7	0

[1] Based on 69 years modeled.

Little Grass Valley and Sly Creek

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would decrease surface water elevations from December until refill for Sly Creek and Little Grass Valley Reservoirs. Little Grass Valley and Sly Creek Reservoirs are upstream from Lake Oroville on the Feather River. These reservoirs would release a combined maximum of 15,000 acre-feet of water from November to December. Figures 14-6 and 14-7 show historic reservoir surface water elevations and the potential change due to EWA actions. A release of a maximum of 12,000 acre-feet from Little Grass Valley would reduce storage by 23 percent, an elevation change of approximately 12 feet. Sly Creek Reservoir would release a maximum of 5,000 acre-feet. This reduction would cause a 17-foot decrease in reservoir elevation. These reductions would not affect activities such as boating and swimming because these activities have low uses during the winter months, the timeframe of the transfer. Other recreational activities such as hunting, hiking, sightseeing, fishing, and winter sports such as snowmobiling and cross-country skiing would not be affected adversely by a decrease in reservoir levels.

The reservoirs would be refilled with rain/snowmelt over the winter and into the spring. In most dry or critically dry water years, Little Grass Valley and Sly Creek Reservoirs refill during the winter and spring to levels sufficient for recreation. In some cases, the reservoir refills during critical years as well (for example, Little Grass Valley refilled in 1976, 1988, 1990-92, and 1994). Because the reservoirs have

historically refilled in most years, it is anticipated that the reservoirs would also refill after selling water to the EWA. In the critically dry years when reservoir levels are extremely low, recreation would be affected regardless of whether Oroville-Wyandotte ID has sold water to the EWA. Therefore, the EWA acquisition of Oroville-Wyandotte ID stored reservoir water and effects on Sly Creek and Little Grass Valley reservoirs would be less than significant.

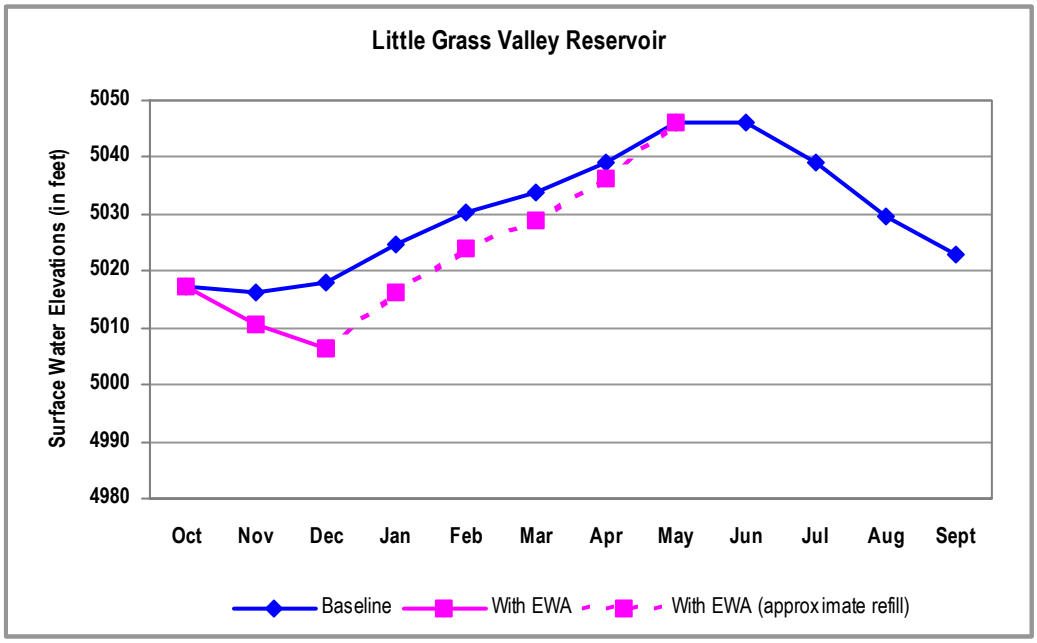


Figure 14-6
Changes in End of Month Surface Water Elevation in Little Grass Valley Reservoir

Note: It is anticipated that refill would occur as indicated in the above figure, depending on hydrologic conditions. However, if inflow were held by Little Grass Valley Reservoir at a time when the Delta was in balanced conditions, the water would be paid back to the Projects in a fashion similar to the original transfer.

According to the refill criteria (Section 4.2.3.1, Water Supply), Little Grass Valley and

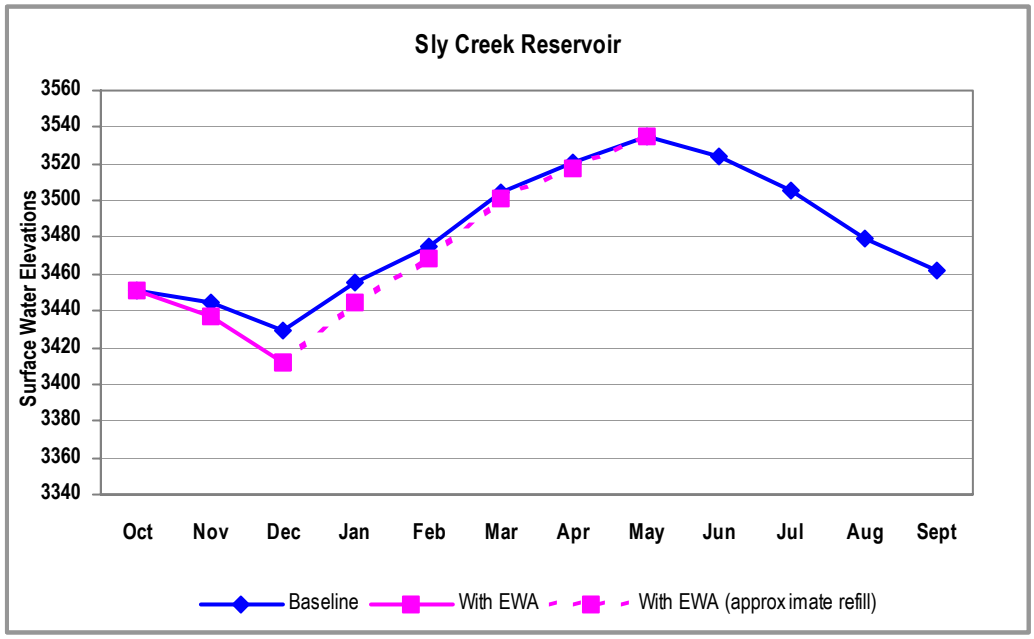


Figure 14-7
Changes in End of Month Surface Water Elevation in Sly Creek Reservoir

Note: It is anticipated that refill would occur as indicated in the above figure, depending on hydrologic conditions. However, if inflow were held by Sly Creek Reservoir at a time when the Delta was in balanced conditions, the water would be paid back to the Projects in a fashion similar to the original transfer.

Sly Creek Reservoirs would refill during the winter with runoff and snowmelt. If these reservoirs capture water while the Delta is not in excess conditions[2] (Section 4.1, Water Supply), the reservoirs will have to repay the water to the Projects the following summer. The water would be released on a similar schedule as the original EWA transfer and would have similar effects. The EWA agencies could enter into multi-year contracts with Oroville-Wyandotte ID, but would not purchase water a second year in a row if the reservoirs did not refill the previous year. The refill criteria are a part of the project; there would therefore be no significant effect on recreation.

Lake Oroville

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase the surface water elevation April to June and decrease the surface water elevation in July and August in Lake Oroville compared to the Baseline Condition. EWA agencies would acquire 110,000 acre-feet through groundwater substitution and 126,550 acre-feet through

[2] Delta excess water conditions, also referred to as unbalanced conditions, are defined in the Coordinated Operation Agreement as "periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in basin uses, plus exports."

crop idling. During April through June, Lake Oroville would hold back water that would have been released under the Baseline Condition. By the end of June, the surface water elevation in the reservoir would be, at most, 2 feet higher than under the Baseline Condition (Figure 14-8), resulting in a minor to modest positive effect on swimming and camping. Increased releases in July and August as the stored EWA water is released for cross-Delta transfer would cause the lake level to decline faster compared to the Baseline Condition; however, reduced releases in September would allow end of month elevation in September to be the same as the Baseline Condition. The small change in elevation would not affect the boat ramps, which are usable until the lake level falls below 700 msl. Low water levels affect boat-in campgrounds before boat ramps; however, the slight decrease in elevation (approximately 1.0 feet)

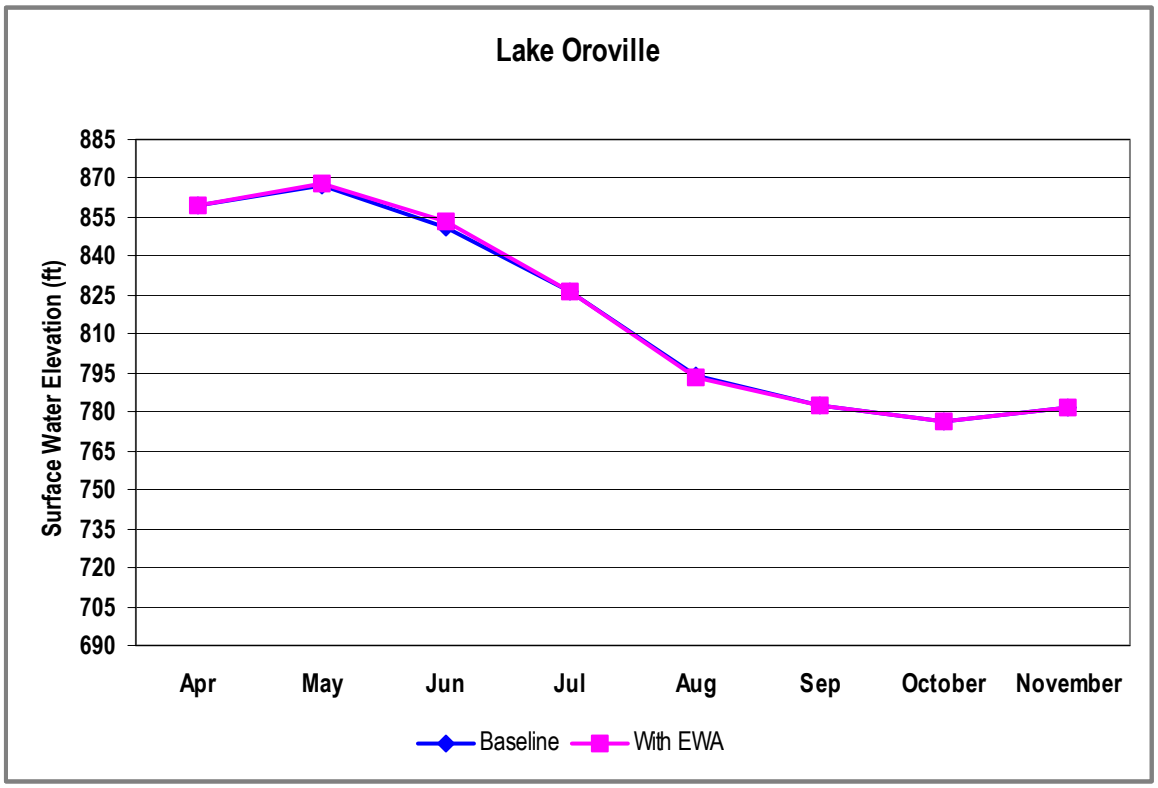


Figure 14-8
Changes in End of Month Surface Water Elevation in Lake Oroville

would not cause a decrease in use. The changes in surface water elevation would not affect fishing, swimming, and boating opportunities; therefore, the effects would be less than significant.

14.2.4.1.4 Yuba River

EWA acquisition of Yuba County WA water via groundwater substitution would decrease Yuba River flows from the power facility discharge upstream from Engelbright to the user's diversion points, typically at Englebright and Daguerre Point Dams from April to June. Yuba River flows would decrease at most by 239 cfs in late spring as farmers use groundwater for irrigation instead of surface water from New Bullards Bar Reservoir.

(A total of 12 to 19 percent reduction in April through June compared to the median flow under the Baseline Condition.) Because of limited river access, recreation is not common along the river. Fishing, however, does take place during this time of year. The decrease in flow would not affect fish population or decrease the quality of fishing. Fishing occurs year round when flows are less they would be with the EWA during April through June. The decrease in flows that would occur would not create a substantial loss of recreational opportunity; therefore, the effect would be less than significant.

EWA acquisition of Yuba County WA water via groundwater substitution and stored reservoir water would increase Yuba River flows downstream from Englebright July through September. Yuba River flows would increase at most by 1,005 cfs in July through September; approximately 60 percent above the Baseline Condition. The flow increase could affect recreational activities such as fishing. During July, August, and September, median flows are 1,791 cfs, 2,045 cfs, and 1,218 cfs, respectively. The flow increase of 1,005 cfs would increase river flows to levels that are fishable and that occur during other times of the year. For example, median flows in January through April are 2,405, 2,683, 3,177, and 2,022, respectively. These flows are comparable to flows that would occur with the EWA in July through September. Additionally, fishing reports indicate that the river is quite fishable at flows of 4,900 cfs and 5,500 cfs (substantially higher than flows with the EWA); however, wading should be undertaken cautiously (Bob's Fly Shack Fly Fishing Report 2003). The change in flow as a result of EWA actions would not increase flows beyond fishable levels. In fact, increased flow is beneficial to fish, which could lead to more favorable fishing conditions. The effect on recreation from increased flow would be less than significant.

Yuba River water temperatures would not be expected to fluctuate from the slower decrease of water from New Bullards Bar Reservoir in April through June. The release of stored reservoir water and groundwater substitution in July through September would decrease Yuba River water temperature. Changes in water temperatures were observed coincident with water transfers during 2001 (transfer of 172,000 acre-feet during July and August). For example, water temperatures at Highway 20 dropped from 73.4°F on July 3 to 62.6°F on July 8. Water temperatures at this site remained around 61°F until flows were reduced in late August, at which time the water temperatures increased with flow reduction. At the mouth of the Yuba River, water temperatures prior to the 2001 water transfers were approximately 73°F, compared to an average of 61°F after water transfers began. Although water temperatures would be substantially colder, recreational opportunities would not be substantially affected. The stretch of the Yuba River below Englebright is not a common recreation spot because of access limitations. The main recreational opportunities that exist are fishing, and swimming to a limited extent. The cooler water temperature is beneficial for fish, which could lead to more favorable fishing conditions. Recreational activities, including swimming, occur throughout the summer on the Sacramento and American Rivers, which have water temperatures ranging from 48°F to 66°F (see Sections 14.2.4.1.2 and 14.2.4.1.5). Yuba River water

temperature with the EWA would be within this range. Therefore, while the water temperature may not be as desirable as without the EWA, recreational users could partake in water dependent activities at lower river water temperatures as demonstrated by use of the American and Sacramento Rivers. The effect on recreation on the Yuba River from the purchase of stored reservoir water and groundwater substitution does not substantially affect recreational opportunities and would therefore be less than significant.

New Bullards Bar Reservoir

EWA acquisition of water from Yuba County Water Agency (Yuba County WA) via stored reservoir water and groundwater substitution would alter the surface water elevation April to refill at New Bullards Bar Reservoir. EWA agencies would acquire 85,000 acre-feet through groundwater substitution. During April through June, New Bullards Bar Reservoir would hold back water that would have been released under the Baseline Condition. By the end of June, the surface water elevation in the reservoir would be, at most, 5 feet higher than under the Baseline Condition (Figure 14-9). An increase in the surface water elevation would likely cause a net positive effect on recreational uses; fishing, swimming, and boating opportunities may be enhanced over the Baseline Condition.

Yuba County WA would not enter into a transfer agreement unless local needs, instream flows, and system demand requirements were met. If these elements were met, EWA agencies could acquire water during July through September. Releases from New Bullards Bar Reservoir would be, at a maximum, 100,000 acre-feet of water from stored reservoir water and 85,000 acre-feet from groundwater substitution. The combination of these releases would reduce lake levels compared to the Baseline Condition by 1 foot, 10 feet, and 24 feet in July, August, and September, respectively. This reduction would leave boat ramps operable into October. Dark Day boat ramp would become inoperable toward mid-October; Cottage Creek boat ramp would remain operable throughout the year. The water in New Bullards Bar Reservoir would decline below the end of the Dark Day boat ramp, but this would occur late in the recreational season. The number of boaters would be fewer than during the peak recreational season (Memorial Day through Labor Day) and the Cottage Creek boat ramp would still be operational; therefore, the recreational opportunity would not be substantially decreased.

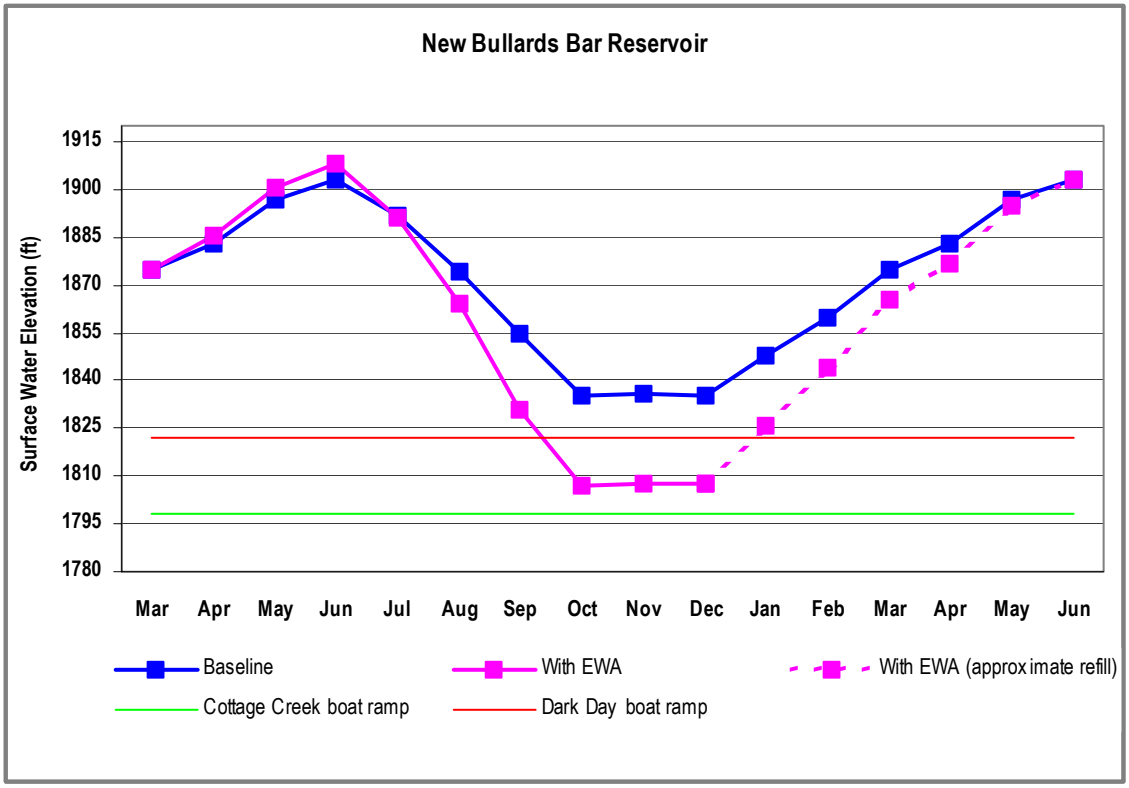


Figure 14-9
Changes in End of Month Surface Water Elevation in New Bullards Bar Reservoir

Note: It is anticipated that refill would occur as indicated in the above figure, depending on hydrologic conditions. However, if inflow were held by New Bullards Bar Reservoir at a time when the Delta was in balanced conditions, the water would be paid back to the Projects in a fashion similar to the original transfer.

Camping, also a popular activity at New Bullards Bar Reservoir, could be affected by a decrease in reservoir levels. Boat-in campgrounds become inaccessible as water levels recede, historically by mid-August (Chavez 2003). With the EWA, the boat-in campground would become inaccessible approximately 1 week earlier than the Baseline Condition because of lower water levels. While this is a decrease in recreational opportunity, it is not a substantial loss of opportunity. Additionally, camping (other than using the boat-in campground) is still available at campgrounds surrounding the reservoir. The overall effect on recreation from the purchase of stored reservoir water would be less than significant.

The EWA agencies and Yuba County WA could agree to transfer water under a multi-year contract. If full refill occurred, which it has for 85 percent of the past transfers, effects on recreation for subsequent years would be the same as described above. If full refill did not occur, Yuba County WA would consider selling less water the following year. The EWA agencies would not purchase water if the transfer would cause a significant effect on recreation.

14.2.4.1.5 American River

EWA acquisition of Placer County WA stored reservoir water would increase American River flows downstream from French Meadows Reservoir to Folsom Lake from June to October. Releases would increase relative to the Baseline Condition. Under the Baseline Condition, median flows downstream from Oxbow Power House on the Middle Fork[3] are 790 cfs, 793 cfs, and 776 cfs during June, July, and August, respectively. If flows increased during this time period, the releases would raise flow rates above the minimum-rafting threshold of 850 cfs, providing a beneficial effect on recreation resources.

EWA acquisition of Placer County WA stored reservoir water would decrease American River flows downstream from French Meadows Reservoir to Folsom Lake during refill of Hell Hole and French Meadows Reservoirs. River flows would decrease during the winter and early spring. During this time of year, recreational activities in and along the river are limited because of cold water and air temperatures. Hiking and wildlife viewing, common winter recreational activities, would not be adversely affected by a decrease in river flow. Fishing is not permitted in the river during winter through early spring. Thus, the EWA acquisition of Placer County WA stored reservoir water and the decrease in American River flows would be less than significant.

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase would increase American River flows downstream from Folsom Lake from June through December. A relatively small increase in flow is not usually associated with any reductions in recreational opportunities. The increases would not be to such a level as to prevent recreational use of the river (e.g., rafting, swimming). The effect on recreational flows on the American River due to groundwater purchase would be less than significant.

The lower American River is a common recreation area for swimmers and rafters. A change in river temperature could affect the enjoyment of recreational users. Table 14-6 shows the average water temperature under the Baseline Condition as well as under the Flexible Purchase Alternative. There are no substantial differences in water temperature; therefore, the effect on recreation on the American River due to groundwater purchase would be less than significant.

[3] Releases from Hell Hole and French Meadows Reservoirs would flow through tunnels for power generation; increases to river flow would not occur until below Oxbow Power House.

Table 14-6
Long-term Average Water Temperature in the American River Below Nimbus Dam Under the Baseline Condition and Flexible Purchase Alternative

Month	Water Temperature[1] (degrees F)		
	Baseline	Flexible Purchase Alt.	Difference
Oct	56.3	56.3	0.0
Nov	56.5	56.5	0.0
Dec	51.2	51.2	0.0
Jan	47.2	47.1	-0.1
Feb	47.8	47.8	0.0
Mar	50.3	50.4	0.1
Apr	53.7	53.8	0.1
May	56.5	56.6	0.1
Jun	59.6	59.6	0.0
Jul	64.3	64.3	0.0
Aug	64.5	64.6	0.1
Sep	65.9	66.1	0.2

[1] Based on 69 years modeled.

Hell Hole and French Meadows Reservoirs

EWA acquisition of Placer County WA stored reservoir water would decrease surface water elevations June to refill at Hell Hole and/or French Meadows Reservoirs. Hell Hole Reservoir and French Meadows Reservoir would release a combined maximum of 20,000 acre-feet of water. The amount released from each reservoir would be at the discretion of Placer County WA. This analysis assumes that 61 percent of the transfer amount would be released from Hell Hole, and the remainder would be released from French Meadows.

French Meadows would release 7,800 acre-feet beginning as early as June and ending as late as October. This analysis assumes that the water would be released between July and September. By the end of the release, the reservoir water surface elevation would drop approximately 8 feet. Figure 14-10 shows the historic reservoir storage, the potential change in storage with the EWA, and the boat ramp elevation at French Meadows Reservoir. EWA releases could cause Hell Hole Reservoir boat ramps to be out of the water (unusable) at the end of October, whereas the boat ramps would be usable through November under the Baseline Condition. Typically boating continues through October or early November (around the time of the first snowfall). Boating/fishing in small craft that could be hand carried to the water's edge would continue to be possible though also somewhat more difficult. Because low water levels affect boat ramps prior to other recreational uses, no other water-dependent activities at French Meadows Reservoir would be affected before the end of October.

Although the boat ramps would be unusable earlier with the EWA than under the Baseline Condition, recreational use of the boat ramps under the Baseline Condition would have stopped at approximately the same time because of weather conditions.

There is no substantial loss of recreational opportunity; therefore, the EWA acquisition of stored reservoir water and the decrease in surface water elevation at French Meadows Reservoir would be less than significant.

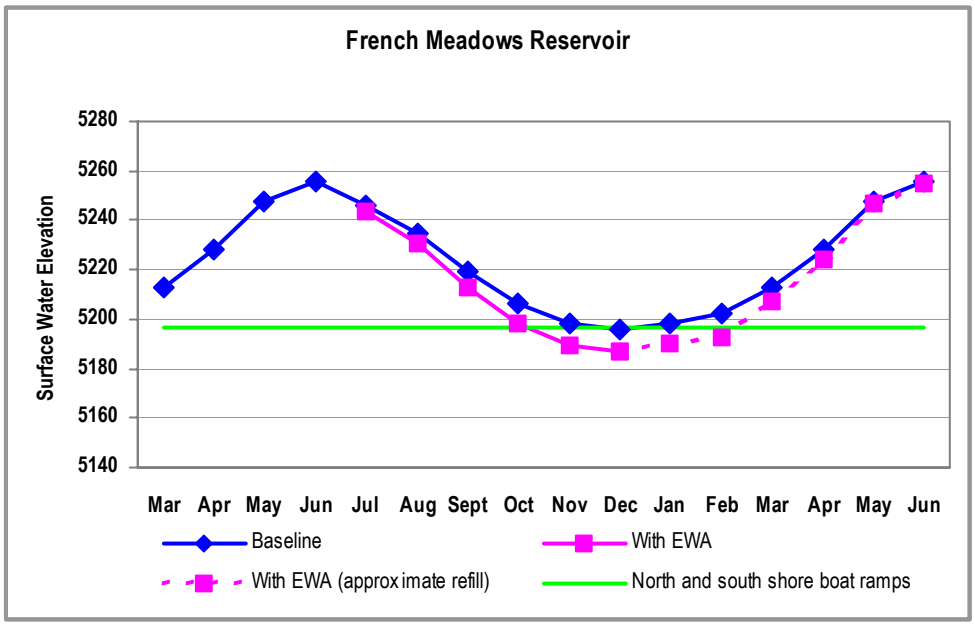


Figure 14-10
Changes in End of Month Surface Water Elevation in French Meadows Reservoir

Note: It is anticipated that refill would occur as indicated in the above figure, depending on hydrologic conditions. However, if inflow were held by French Meadows Reservoir at a time when the Delta was in balanced conditions, the water would be paid back to the Projects in a fashion similar to the original transfer.

Figure 14-11 shows the historic end-of-month storage at Hell Hole Reservoir and the end-of-month storage due to EWA actions during the transfer periods. The release of 12,200 acre-feet would reduce the water surface level by 14 feet. Camping and fishing are the major recreational activities on the reservoir, and these activities would not be significantly affected by a decrease in reservoir levels. As stated in Chapter 9, this change in reservoir level would not affect fish populations or the quality of fishing at the reservoir adversely. Historically, the boat ramp at Hell Hole Reservoir is unusable during winter because of low reservoir levels. Winter access would not change under the Flexible Purchase Alternative. Additionally, the boat ramp would remain usable during peak recreational months despite the decrease in reservoir levels. EWA releases could cause Hell Hole Reservoir boat ramps to be out of the water (unusable) at the end of October, whereas the boat ramps would be usable through November under the Baseline Condition. Typically boating continues through October or early November. After the first snowfall, access over the ridge becomes difficult. Boating/fishing in small craft that could be hand carried to the water's edge would continue to be possible though also somewhat more difficult. (Jue 2003) Therefore, although the boat ramps would be unusable earlier with the EWA than under the

Baseline Condition, recreational use of the boat ramps under the Baseline Condition would have stopped at approximately the same time because of weather conditions. There is no substantial loss of recreational opportunity; therefore, the EWA acquisition of stored reservoir water and the decrease in surface water elevation at Hell Hole Reservoir would be less than significant.

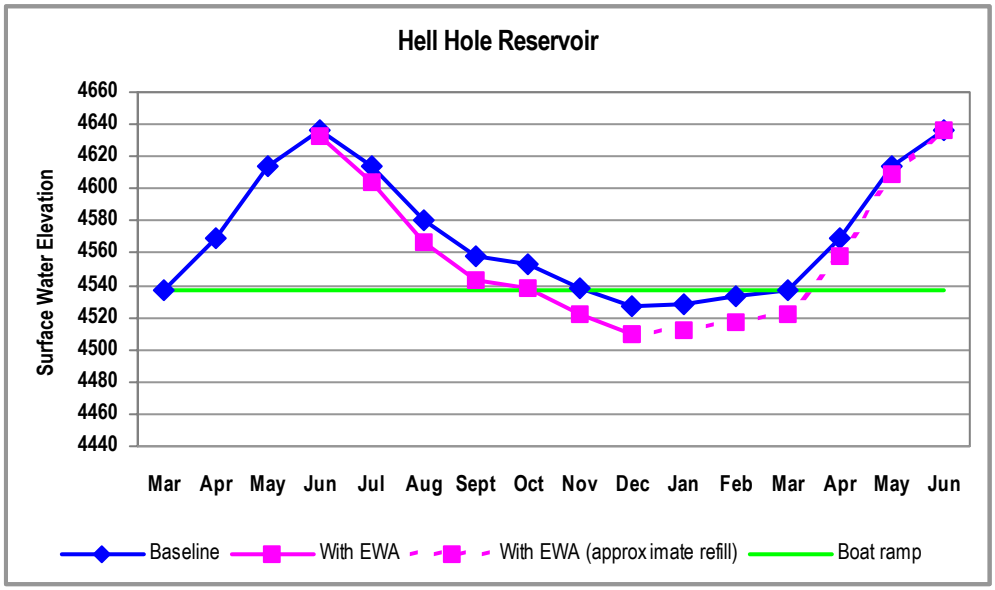


Figure 14-11
Changes in End of Month Surface Water Elevation in Hell Hole Reservoir

Note: It is anticipated that refill would occur as indicated in the above figure, depending on hydrologic conditions. However, if inflow were held by Hell Hole Reservoir at a time when the Delta was in balanced conditions, the water would be paid back to the Projects in a fashion similar to the original transfer.

According to the refill criteria (Section 4.2.3), Hell Hole and French Meadows Reservoirs would refill during the winter with runoff and snowmelt. If the reservoirs capture water while the Delta is not in excess conditions, water would be released and paid back to the Projects on a similar schedule as the original EWA transfer, and effects would be similar. If the EWA agencies acquired water through a multi-year contract with Placer County WA, water could be transferred during a second year, even if the reservoirs did not refill the year before, as long as the two reservoirs did not drop below a combined 50,000 acre-feet of storage (minimum operating levels). Thus, at a maximum, EWA actions could reduce storage at Hell Hole by 24,400 acre-feet (to 118,000 acre-feet) and at French Meadows by 15,600 acre-feet (to 67,000 acre-feet). This decrease in storage would be less than significant because the surface storage during peak recreation times would remain at or above minimum boat ramp operating levels.

Folsom Lake

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase and Placer County Water Agency's water via stored reservoir water would change surface water elevations in Folsom Lake. During July and August, the surface water elevation at Folsom Lake would be 0.8 of a foot lower than the Baseline Condition. The lake level would decline faster in July and August compared to Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September (Figure 14-12). The small change in elevation would not affect the boat ramps, which are usable until the lake level falls below 412 feet msl. Lower lake elevations affect boat ramps and other water-dependent activities simultaneously. Because low water levels do not significantly affect boat ramps, other water-dependent activities would also not be significantly affected.

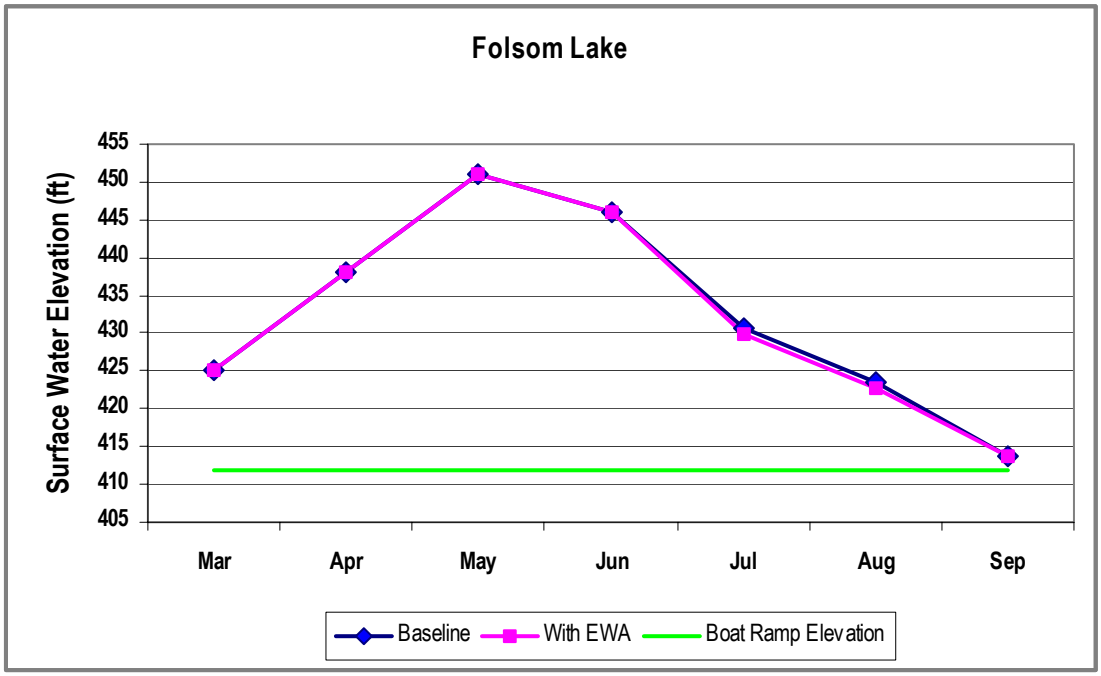


Figure 14-12
Change in End of Month Surface Water Elevation in Folsom Lake

14.2.4.1.6 Merced River

EWA acquisition of Merced ID water via groundwater substitution would decrease Merced River flows downstream from New Exchequer Dam to the point of diversion in April through June. Merced River flows in this reach would decrease by approximately 70 cfs (between 8 percent and 14 percent of monthly median flows). This reach of river has several dams and is not easily accessible for recreation. The recreational opportunities

that do exist on the river (e.g., fishing) would not be affected by the predicted decrease in flow. Flows with the EWA would be comparable to or higher than flows during the summer months under the Baseline Condition when the river is fishable. There would be no substantial loss of recreational opportunity on the Merced River as a result of groundwater substitution.

Lake McClure

EWA acquisition of Merced ID water via groundwater substitution would increase the water surface elevation in Lake McClure compared to the Baseline Condition. EWA agencies could acquire 25,000 acre-feet through groundwater substitution. During April through September, Lake McClure would hold back water that would have been released under the Baseline Condition. By the end of September, the surface water elevation in the reservoir would be, at most, 3 feet higher than the Baseline Condition (Figure 14-13). An increase in the surface water elevation would have a slightly beneficial effect on recreational uses; fishing, swimming, and boating opportunities would be slightly enhanced over the Baseline Condition. Under a multi-year transfer, effects on recreation from groundwater substitution would be same as described for a 1-year transfer.

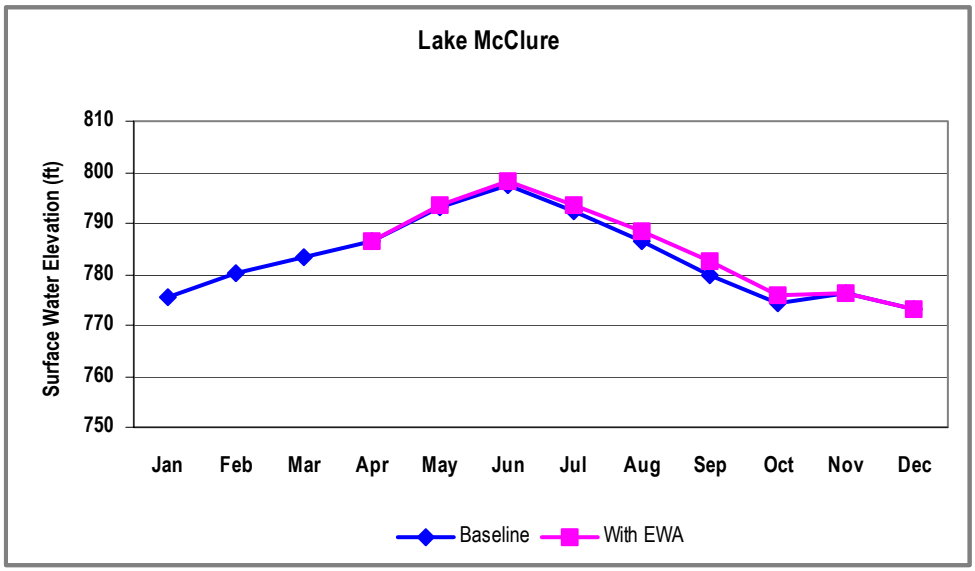


Figure 14-13
Changes in End of Month Surface Water Elevation in Lake McClure

14.2.4.2 Delta

There would be no decreases in Delta inflows from the Sacramento or San Joaquin Rivers under the Flexible Purchase Alternative. Because river water temperatures are not significantly affected in the Upstream from the Delta Region, there would be no adverse effect on recreation from changes in water temperature in the Delta. Therefore, no effects on recreation in the Delta would be anticipated.

14.2.4.3 Export Service Area

14.2.4.3.1 Anderson Reservoir

Source shifting at Anderson Reservoir would decrease the summer surface water elevation compared to the Baseline Condition. Anderson Reservoir would be used to compensate Santa Clara Valley Water District's delayed receipt of water from San Luis. A maximum of 20,000 acre-feet could be source shifted. Per District Resolution 605, the District would not draw down the reservoir below its minimum summer pool of 20,000 acre-feet, which is necessary to maintain recreational opportunities. Because the minimum storage would not be lowered with the EWA, there would be no significant effects on recreation.

14.2.4.3.2 San Luis Reservoir

Borrowing project water from San Luis Reservoir would decrease surface water elevations. Under the Baseline Condition, surface water elevations in San Luis Reservoir would begin to decrease in mid-April. At approximately 300,000 acre-feet, the "low-point problem" at San Luis Reservoir occurs, where warm-season algae growth and decreasing summer levels can affect the quality of the reservoir water and impair the ability of urban water agencies to treat the water adequately for municipal and industrial uses. EWA actions would be managed to prevent contributing to or aggravating the low point problem. (See Figure 2-13, Section 2.4.3.4.2.) Under the Baseline Condition, San Luis Reservoir is drawn down each summer; however, multi-stage boat ramps allow continued access to the reservoir during low water levels. Under the Flexible Purchase Alternative, there would be no significant change to recreational opportunities, including water-enhanced and water-based activities. Therefore, the effect of borrowing project water would be less than significant.

14.2.4.3.3 Lake Mathews, Lake Perris, Castaic Lake, and Diamond Valley Lake

Source shifting would decrease the summer surface water elevation of the targeted reservoirs. Metropolitan WD has many options for source shifting. These options include:

- **Lake Mathews, Lake Perris, Castaic Lake, and Diamond Valley Lake.** Metropolitan WD could delay delivery of SWP water and draw its supplies instead from these storage facilities and accept the SWP water deliveries at a later date.

- **Semitropic and Arvin Edison.** During wet years, Metropolitan WD could reduce deliveries when they would have otherwise delivered water to storage. Metropolitan WD could then deliver SWP water to Semitropic and Arvin Edison at a later date.

- **Hayfield (upstream aqueduct groundwater storage on the Colorado River).** Metropolitan WD could delay delivery of Colorado River water to Hayfield; the water would be delivered at a later date.

- **Change blend.** Metropolitan WD generally maximizes water sources and quality by blending Colorado River and SWP water 50:50. Metropolitan WD could change the blend to provide water for source shifting.

Lake Mathews
Because there is no public access to Lake Mathews and no recreational opportunities on the lake, there would be no effects on recreation.

Lake Perris and Castaic Lake
Metropolitan WD has rights to flexible storage in Castaic Lake and Lake Perris allowing the agency to borrow water from the lakes for up to 5 years, subject to DWR approval. The flexible storage in Castaic Lake is 153,940 acre-feet and 65,000 acre–feet in Lake Perris. The Monterey Agreement[4], signed in 1995, established these amounts of storage for Metropolitan WD. Metropolitan WD has exercised this storage several times, including in 2001 as part of the source shifting agreement in that year. The amount of water that could be source shifted under the EWA would fall within the recent operating parameters of both Castaic Lake and Lake Perris provided Lake Perris is not drawn more than 20,000 acre-feet below its full volume.

Operating within the limits of this flexible storage produces some adverse effects to recreation within the Baseline Condition. With the Flexible Purchase Alternative, however, effects on recreational facilities could occur more frequently compared to the Baseline Condition. Although no further drawdown of the reservoirs would occur beyond what is permitted as a part of the agency's flexible storage, the increased frequency of the drawdown would be a potentially significant impact. The mitigation measures listed in Section 14.2.7 would coordinate reservoir operations to reduce drawdown during peak recreational periods and therefore reduce the potentially significant impact to less than significant.

Diamond Valley Lake
At the development of this document, recreational facilities at Diamond Valley Lake were not complete; therefore, no analysis on the potential effects on those facilities is possible. Given the size of Diamond Valley, 800,000 acre-feet, the amount of water used for EWA assets would not likely have an adverse effect on recreation.

14.2.5 Environmental Consequences/Environmental Impacts of the Fixed Purchase Alternative

The Fixed Purchase Alternative specifies purchases of 35,000 acre-feet from the Upstream from the Delta Region, and 150,000 acre-feet from the Export Service Area. While the amounts in each region are fixed, the acquisition types and sources could vary. To allow the EWA Project Agencies maximum flexibility when negotiating purchases with willing sellers, this section analyzes the effects on each potential transfer. These transfers are the same actions as those described for the Flexible Purchase Alternative, but the amounts are limited by the total acquisition amount in each region (35,000 acre-feet from the Upstream from the Delta Region and 150,000 acre-feet from the Export Service Area).

[4] The Monterey Agreement, signed in 1994 by DWR and SWP water contractors, addresses water supply reliability problems, provides greater flexibility in water operations, and provides greater financial stability for SWP contractors.

14.2.5.1 Upstream from the Delta Region

14.2.5.1.1 Hunting and Fishing

EWA acquisition of water in the Upstream from the Delta Region could alter the locations of hunting areas. Rice fields that are flooded during the winter provide habitat for waterfowl and therefore are common hunting areas. If rice acreage is idled, waterfowl may be found on different fields than previous years; therefore, hunters would need to travel to different locations. As stated in Chapter 10, waterfowl populations would not decrease. Birds may flock to different fields, but the total number of birds and, therefore, the population from which to hunt from, would not decrease. Although hunting locations would change, hunting opportunities would stay the same; therefore, there would be no significant effect on recreation from idling rice fields.

EWA acquisition of water would change reservoir levels and river flows, potentially affecting fishing opportunities. Fishing in reservoirs and rivers is a popular recreational activity. The timing, flow, and volume changes that would occur in reservoirs and rivers would not affect fish populations (see Chapter 9). Because the same number of fish would be present under the Baseline Condition compared to with the EWA, there would be no significant effects on recreational fishing opportunities due to a decrease in fish population.

14.2.5.1.2 Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would decrease Sacramento River flows from Lake Shasta downstream to the point of diversion in June. EWA acquisition of up to 35,000 acre-feet of water via groundwater substitution or up to 35,000 acre-feet from crop idling would decrease monthly Sacramento River flows by 180 cfs in June. The reduction from 18,180 cfs to 18,000 cfs in June would not affect rafting or boating, which have a minimum threshold of 5,000 cfs. Thus, the decrease in median monthly flows during June would be less than significant.

Lake Shasta

The decrease in water released from Lake Shasta in June and the subsequent increase in water released July through August would not affect Sacramento River water temperature. (Table 14-4 shows changes in river temperature for the Flexible Purchase Alternative. Because there is no change in temperature under larger transfer amounts, there would be no temperature change for lesser transfer amounts under the Fixed Purchase Alternative.) Because there is no change in water temperature under the Fixed Purchase Alternative, there would be no effect to recreational users due to an increase or decrease in water temperature; the effect would be less than significant.

14.2.5.1.3 Feather River

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase Feather River flows in July through September. A maximum of an additional 35,000 acre-feet would be released from Lake Oroville, which would increase flows on the Feather River below

the Thermalito Afterbay. The effects of these EWA actions are evaluated in Section 14.2.4.1.3, Feather River for the Flexible Purchase Alternative. The increase in flow on the Feather River would be greater under the Flexible Purchase Alternative than under the Fixed Purchase Alternative. There are no significant effects on recreation under the Flexible Purchase Alternative; therefore, there would no be significant effects on recreation under the Fixed Purchase Alternative.

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would increase Feather River flows below Sly Creek and Little Grass Valley Reservoirs to Lake Oroville in November and December. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 14.2.4.1.3, Feather River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative are less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

Sly Creek and Little Grass Valley Reservoirs

EWA acquisition of Oroville-Wyandotte Irrigation District (Oroville-Wyandotte ID) stored reservoir water would decrease surface water elevations December until refill for Sly Creek and Little Grass Valley Reservoirs. Little Grass Valley and Sly Creek Reservoirs are upstream from Lake Oroville on the Feather River. These reservoirs would release a combined maximum of 15,000 acre-feet of water from November to December. Figures 14-6 and 14-7 show historic reservoir surface water elevations and the potential change due to EWA actions. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 14.2.4.1.3, Feather River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative would be less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

Lake Oroville

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase the surface water elevation April to June and decrease the surface water elevation in July and August in Lake Oroville compared to the Baseline Condition. EWA could acquire up to 35,000 acre-feet of water via groundwater substitution or up to 35,000 acre-feet from crop idling. Effects on Lake Oroville recreation from an increase (April through June) and decrease (July and August) in surface water elevation are evaluated in Section 14.2.4.1.3, Feather River for the Flexible Purchase Alternative. There would be less change in surface water elevation under the Fixed Purchase Alternative than under the Flexible Purchase Alternative. Because there were no significant effects under the Flexible Purchase Alternative, there would also be no significant effects under the Fixed Purchase Alternative.

14.2.5.1.4 Yuba River

EWA acquisition of Yuba County WA water via groundwater substitution would decrease Yuba River flows from April to June. Yuba River flows would decrease by 195 cfs in late

spring as farmers use groundwater for irrigation instead of surface water from New Bullards Bar Reservoir. Because of limited river access, recreation use is not common along the river. The slight decreases in flows (10 to 16 percent of the median monthly flow) that would occur would not adversely affect the few recreational users.

Yuba River water temperatures would not be expected to fluctuate from the slower release of water from New Bullards Bar Reservoir in April through June. In July through September, an additional release (195 cfs) would be released from New Bullards Bar Reservoir. The increased release could lower river temperature. The effects described in Section 14.2.4.1.4, Yuba River, under the Flexible Purchase Alternative analyzed effects on river temperature for a greater release. Because there were no significant effects under the Flexible Purchase Alternative, there would be no significant effects on recreation because of changes in river temperature under the Fixed Purchase Alternative.

New Bullards Bar Reservoir

EWA acquisition of Yuba County Water Agency (Yuba County WA) stored reservoir water would decrease surface water elevations July to refill at New Bullards Bar Reservoir. New Bullards Bar Reservoir would release, at a maximum, 35,000 acre-feet of water to be used as an EWA asset. Yuba County WA would not enter into a transfer agreement unless local needs, instream flows, and system demand requirements were met. If these elements were met, EWA agencies could acquire up to 35,000 acre-feet, decreasing the reservoir elevation 8 feet by September, from 1,855 msl to 1,847 feet msl. The Dark Day and Cottage Creek boat ramps would remain usable at this elevation; therefore, there would be no significant effects on recreation.

14.2.5.1.5 American River

EWA acquisition of Placer County WA stored reservoir water would increase American River flows downstream from French Meadows Reservoir to Folsom Lake from June to October. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 14.2.4.1.5, American River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative are beneficial; the effects of the Fixed Purchase Alternative are also beneficial.

EWA acquisition of Placer County WA stored reservoir water would decrease American River flows downstream from French Meadows Reservoir to Folsom Lake during refill of Hell Hole and French Meadows Reservoirs. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 14.2.4.1.5, American River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative would be less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase would increase American River flows downstream from Folsom Lake from June through December. The same amount of water could be transferred under the Fixed

Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 14.2.4.1.5, American River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative were less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

The lower American River is a common recreation area for swimmers and rafters. A change in river temperature could affect the enjoyment of recreational users. Table 14-5 shows the average water temperature under the Baseline Condition as well as under the Flexible Purchase Alternative. Because the amount of water transferred under the Flexible Purchase Alternative is the same as under the Fixed Purchase Alternative, the table is accurate for the Fixed Purchase Alternative as well. There would be no substantial differences in water temperature; therefore, the effect on recreation on the American River due to groundwater purchase would be less than significant.

Hell Hole and French Meadows Reservoirs
EWA acquisition of Placer County WA stored reservoir water would decrease surface water elevations June to refill at Hell Hole and/or French Meadows Reservoirs. Hell Hole Reservoir and French Meadows Reservoir would release a combined maximum of 20,000 acre-feet of water. An equivalent amount of water could be sold to the EWA agencies under the Fixed Purchase Alternative, as is described under the Flexible Purchase Alternative. Refer to Section 14.2.4.1.5, American River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative were less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

14.2.5.1.6 Merced River

EWA acquisition of Merced ID water via groundwater substitution would decrease Merced River flows downstream from New Exchequer Dam to the point of diversion in April through June. Merced River flows would decrease by approximately 70 cfs. An equivalent amount of water could be sold to the EWA agencies under the Fixed Purchase Alternative, as is described under the Flexible Purchase Alternative. Refer to Section 14.2.4.1.6, Merced River, for a discussion of potential effects. The effects of the Flexible Purchase Alternative were less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

Lake McClure
EWA acquisition of Merced ID water via groundwater substitution would increase the water surface elevation in Lake McClure compared to the Baseline Condition. EWA agencies could acquire 25,000 acre-feet through groundwater substitution. As shown in Figure 14-11, water levels in Lake McClure would only increase. An increase in surface water elevation would have a less-than-significant effect on recreational use.

14.2.5.2 Delta

There would be no decreases in Delta inflows from the Sacramento or San Joaquin rivers under the Fixed Purchase Alternative. Because river water temperatures are

not significantly affected in the Upstream from the Delta Region, there would be no adverse effect on recreation from changes in water temperature in the Delta. Therefore, the effects on recreation in the Delta would be less than significant.

14.2.5.3 Export Service Area

14.2.5.3.1 Anderson Reservoir

Source shifting at Anderson Reservoir would decrease the summer surface water elevation compared to the Baseline Condition. Anderson Reservoir would be used to compensate Santa Clara Valley Water District's delayed receipt of water from San Luis. A maximum of 20,000 acre-feet could be source shifted. An equivalent amount of water could be sold to the EWA agencies under the Fixed Purchase Alternative, as is described under the Flexible Purchase Alternative. Refer to Section 14.2.4.3.1, Anderson Reservoir, for a discussion of potential effects. The effects of the Flexible Purchase Alternative were less than significant; the effects of the Fixed Purchase Alternative would also be less than significant.

14.2.5.3.2 Lake Mathews, Lake Perris, Castaic Lake, and Diamond Valley Lake

Source shifting would decrease the summer surface water elevation of the targeted reservoirs. Source shifting options by Metropolitan WD would be the same under the Fixed Purchase Alternative as those described under the Flexible Purchase Alternative. Metropolitan WD could source shift a maximum of 200,000 acre-feet using the options described in Section 14.2.4.3.2. The effects stated in Section 14.2.4.3.2 would be the same for the Fixed Purchase Alternative. The potentially significant impact would be reduced to less than significant with the implementation of the mitigation measures listed in Section 14.2.7.

Borrowing project water from San Luis Reservoir would decrease surface water elevations. Under the Baseline Condition, surface water elevations in San Luis Reservoir would begin to decrease in mid-April. At approximately 300,000 acre-feet, the low-point problem at San Luis Reservoir occurs, whereby warm-season algae growth and decreasing summer levels can affect the quality of the reservoir water and impair the ability of urban water agencies to treat the water adequately for municipal and industrial uses. EWA actions would be managed to prevent contributing to or aggravating the low point problem. (See Figure 2-13, Section 2.4.3.4.2.) Under the Baseline Condition, San Luis Reservoir is drawn down each summer; however, multi-stage boat ramps allow continued access to the reservoir during low water levels. Under the Fixed Purchase Alternative, there would be no change to recreational opportunities, including water-enhanced and water-based activities. Therefore, the effect of borrowing project water would be less than significant.

14.2.6 Comparative Analysis of Alternatives

This chapter has thus far analyzed the effects of many potential transfers, looking at the "worst-case scenario" that would occur if all acquisitions happened in the same year. This approach ensures that all effects of transfers are included and provides the EWA Project Agencies the flexibility to choose transfers that may be preferable in a given year. The EWA, however, would not actually purchase all of this water in the

same year. This section provides information about how EWA would more likely operate in different year types. A further comparison of the alternatives is listed in Table 14-7.

In the Upstream from the Delta Region, recreational opportunities under the No-Project Alternative would be affected by year type. During wet years, increased precipitation and runoff would cause water surface elevations in reservoirs to be higher, which is beneficial for recreation. Dry years would produce limited inflow, which could cause boat ramps, campgrounds, and beaches to become inaccessible. Effects would be the same in the Export Service Area.

The Fixed Purchase Alternative would be limited to a maximum acquisition of 35,000 acre-feet from all sources of water. This amount could typically be obtained from stored reservoir water purchases in most year types. In very dry years, stored reservoir water may not be available, and the EWA would need to look to other sources. However, because water acquisitions would most likely be from stored reservoir water, the effects from the transfers described in this Draft EIS/EIR for recreation resources most likely would occur each year.

The Flexible Purchase Alternative could involve the purchase of up to 600,000 acre-feet of water from all sources in the Upstream from the Delta Region. EWA agencies would prefer to purchase water from upstream sources because the water is generally less expensive. The amount that could be purchased would be limited by the capacity of the Delta export pumps to move the water to the Export Service Area. During wet years, excess pump capacity may be limited to as little as 50,000 to 60,000 acre-feet of EWA asset water because the pumps primarily would be used to export Project water to Export Service Area users. Effects during wet years would therefore be close to those described under the Fixed Purchase Alternative. During dry years, when there would be less Project water available for pumping (and therefore the pumps would have greater availability capacity), the EWA Project Agencies could acquire up to 600,000 acre-feet of water from sources in the Upstream from the Delta Region.

The EWA Project Agencies usually prefer to purchase stored reservoir water because it is the least expensive option. In dry years, they would likely purchase all stored reservoir water available, and then look to other options for the remainder of their purchases. Therefore, the effects during dry years would be similar to those described in this Draft EIS/EIR. The effects on recreational resources, even under a maximum purchase scenario, were determined to be less than significant. In wet years, a portion of the stored reservoir water available would likely provide the entire amount of water that could be moved through the Delta.

The EWA agencies could manage water through source shifting in the Export Service Area under the Flexible Purchase and Fixed Purchase Alternatives. Source shifting is not dependent on water year type, but is related to demand on San Luis Reservoir. The EWA agencies would implement source shifting more frequently under the Fixed Purchase Alternative than under the Flexible Purchase Alternative, which would

draw down the reservoirs more often. Mitigation measures would reduce the potential effects for both alternatives.

Table 14-7
Comparison of the Effects of the Flexible and Fixed Purchase Alternatives on Recreation Resources

Region	*Asset Acquisition or Management*	*Result*	*Impacts*	*Flexible Purchase Alternative Change from the Baseline Condition*	*Fixed Purchase Alternative Change from the Baseline Condition*	*Significance of Flexible Purchase Alternative*	*Significance of Fixed Purchase Alternative*
Upstream from the Delta Region							
Sacramento River	Crop Idling	Rice acreage is idled.	Waterfowl may be found on different fields than in previous years.	Hunting locations would change, but the hunting opportunities would stay the same.	Hunting locations would change, but the hunting opportunities would stay the same.	LTS[5]	LTS
	Groundwater substitution/ Crop idling Flex: 225 TAF Fixed: 35 TAF	Water held in Lake Shasta in June.	Slower decrease in water levels in Lake Shasta in June, relative to the Baseline Condition.	Sacramento River decreases 1,160 cfs in June.	Sacramento River decreases 180 cfs.	LTS	LTS
				Lake Shasta contains as much as 68,900 acre-feet more compared to the Baseline Condition.	Lake Shasta contains as much as 9,000 acre-feet more compared to the Baseline Condition.	LTS	LTS
		Water released from Lake Shasta is not diverted.	Increase in Sacramento River flow compared to the Baseline Condition downstream from point of diversion in April through September (excluding June if water is held in June).	Sacramento River increases by as much as 1,940 cfs in July.	Sacramento River increases by 240 cfs.	LTS	LTS
Feather River	Crop Idling	Rice acreage is idled.	Waterfowl may be found on different fields than in previous years.	Hunting locations would change, but the hunting opportunities would stay the same.	Hunting locations would change, but the hunting opportunities would stay the same.	LTS	LTS

[5] LTS= Less than Significant

Table 14-7
Comparison of the Effects of the Flexible and Fixed Purchase Alternatives on Recreation Resources

Region	*Asset Acquisition or Management*	*Result*	*Impacts*	*Flexible Purchase Alternative Change from the Baseline Condition*	*Fixed Purchase Alternative Change from the Baseline Condition*	*Significance of Flexible Purchase Alternative*	*Significance of Fixed Purchase Alternative*
Feather River	Stored reservoir water Flexible & Fixed: Sly Creek 5,000 acre-feet Little Grass Valley 12,000 acre-feet.	Water is released from Sly Creek and Little Grass Valley Reservoirs.	Sly Creek and Little Grass Valley Reservoirs are lower than the Baseline Condition from November until refill.	Sly Creek reduced by maximum of 5,000 acre-feet and 17 ft in elevation. Little Grass Valley reduced by maximum of 12,000 acre-feet and 23 ft in elevation.	Sly Creek reduced by maximum of 5,000 acre-feet and 17 ft in elevation. Little Grass Valley reduced by maximum of 12,000 acre-feet and 23 ft in elevation.	LTS	LTS
			Increased flows diverted through Woodleaf and Forbestown tunnels in November and December	No effect on recreation.	No effect on recreation.	No effect	No effect
	Groundwater substitution/ Crop idling Flexible: 236,500 acre-feet. Fixed: 35,000 acre-feet.	Water is held in Lake Oroville in April through June.	Slower decrease in water levels in Lake Oroville from April – June, relative to the Baseline Condition.	Lake Oroville would be at most, 2 feet higher than the Baseline Condition.	Lake Oroville contains as much as 17,900 acre-feet more than the Baseline Condition.	LTS	LTS
		Water is released from Lake Oroville	Feather River flows downstream from Lake Oroville increase July – September	Feather River increases by a maximum of 2,105 cfs.	Feather River increases by a maximum of 212 cfs.	LTS	LTS
Yuba River	Stored Reservoir Water and Groundwater Substitution Flexible: 100 TAF Fixed: 35 TAF	Water is held in New Bullards Bar Reservoir.	Yuba River flows decrease April – June	Yuba River flow decreases by 239 cfs	Yuba River flow decreases by 100 cfs	LTS	LTS
		Timing of water released from New Bullards Bar Reservoir is changed.	Slower decrease in water levels in New Bullards Bar Reservoir from April – September, relative to the Baseline Condition.	New Bullards Bar Reservoir is 5 ft higher in elevation compared to the Baseline Condition.	New Bullards Bar Reservoir is 2 ft higher in elevation compared to the Baseline Condition.	LTS	LTS
			Yuba River flows increase July – September.	Yuba River flows increase by 1,005 cfs.	Yuba River flows increase by 195 cfs	LTS	LTS
			New Bullards Bar water levels are lower than the Baseline Condition July – refill.	New Bullards Bar reduced by a maximum of 100,000 acre-feet and 24 ft in elevation.	New Bullards Bar reduced by a maximum of 35,000 acre-feet and 8 ft in elevation.	LTS	LTS

Table 14-7
Comparison of the Effects of the Flexible and Fixed Purchase Alternatives on Recreation Resources

Region	*Asset Acquisition or Management*	*Result*	*Impacts*	*Flexible Purchase Alternative Change from the Baseline Condition*	*Fixed Purchase Alternative Change from the Baseline Condition*	*Significance of Flexible Purchase Alternative*	*Significance of Fixed Purchase Alternative*
American River	Crop Idling	Rice acreage is idled.	Waterfowl may be found on different fields than in previous years.	Hunting locations would change, but the hunting opportunities would stay the same.	Hunting locations would change, but the hunting opportunities would stay the same.	LTS	LTS
	Stored Reservoir Water Flexible & Fixed: 20,000 acre-feet	Water is released from French Meadows and Hell Hole Reservoirs	French Meadows and Hell Hole Reservoirs are lower than the Baseline Condition June – refill	French Meadows decreases by 7,800 acre-feet and 8 ft in elevation. Hell Hole decreases by 12,200 acre-feet and 14 ft in elevation.	French Meadows decreases by 7,800 acre-feet and 8 ft in elevation. Hell Hole decreases by 12,200 acre-feet and 14 ft in elevation.	LTS	LTS
			Flows in the American River between French Meadows/Hell Hole Reservoirs and Folsom Lake are increased July – September	American River flow increases.	American River flow increases.	LTS	LTS
	Stored Reservoir Water and Groundwater Purchase	Water is released from Folsom Lake.	American River flows downstream from Folsom Lake increase June – December	American River flow increases.	American River flow increases.	LTS	LTS
			Surface water elevation in Folsom Lake is lower than the Baseline Condition in July and August.	Surface water elevation in Folsom Lake is 0.8 foot lower than the Baseline Condition.	Surface water elevation in Folsom Lake is 0.8 foot lower than the Baseline Condition.	LTS	LTS

Table 14-7
Comparison of the Effects of the Flexible and Fixed Purchase Alternatives on Recreation Resources

Region	*Asset Acquisition or Management*	*Result*	*Impacts*	*Flexible Purchase Alternative Change from the Baseline Condition*	*Fixed Purchase Alternative Change from the Baseline Condition*	*Significance of Flexible Purchase Alternative*	*Significance of Fixed Purchase Alternative*
Merced/San Joaquin River	Groundwater Substitution Flexible & Fixed: 25,000 acre-feet.	Water is held in Lake McClure	Slower decrease in water levels in Lake McClure in April through October, compared to the Baseline Condition.	Lake McClure surface water elevation increases by a maximum of 3 ft.	Lake McClure surface water elevation increases by a maximum of 3 ft.	LTS	LTS
			Merced River flows decrease April – October.	Merced River flow decreases by 70 cfs	Merced River flow decreases by 70 cfs	LTS	LTS
Export Service Area							
Export Service Area	Source Shifting	Water is drawn from Anderson Reservoir	Decreased water levels in Anderson Reservoir compared to the Baseline Condition.	Water levels decreased by a maximum of 20,000 acre-feet.	Water levels decreased by a maximum of 20,000 acre-feet.	LTS	LTS
		Water is drawn from Metropolitan WD storage in reservoirs	Decreased water levels in Castaic, Perris, Mathews, and Diamond Valley	Water levels decreased by 200,000 acre-feet.	Water levels decreased by 200,000 acre-feet.	PS; LTS with mitigation measures.	PS; LTS with mitigation measures.
	Borrowed Project Water	EWA water is released from San Luis Reservoir earlier in the year compared to the Baseline Condition.	Decreased water levels in San Luis Reservoir	Lower water levels in July and August	Lower water levels in July and August	LTS	LTS

14.2.7 Mitigation Measures

The following mitigation measures will be implemented for potential effects caused by source shifting at Lake Perris and Castaic Lake:

- Water storage will be maximized to the extent possible during peak recreation use periods, especially summer months; and

- For Lake Perris, the EWA agencies would include in source shifting contracts with Metropolitan WD a limitation on the amount of flexible storage that can be drawn from that source. The limit would be determined with input from officials at Lake Perris Recreation Area. For Castaic Lake, the input from recreation officials should be considered so that ongoing planning and management of the recreation facilities can be coordinated with reservoir operations. Once schedules are known,

recreation area operators should be notified as soon as possible, in order to maximize management efforts.

14.2.8 Potentially Significant Unavoidable Impacts

There are no potentially significant unavoidable impacts.

14.2.9 Cumulative Effects

14.2.9.1 Upstream from the Delta Region

The Sacramento Valley Water Management Agreement, Dry Year Purchase Program, Drought Risk Reduction Investment Program, CVPIA Water Acquisition Program, and Environmental Water Program include water acquisitions upstream from the Delta. These programs all include stored reservoir water, and many include other acquisition types such as groundwater substitution, groundwater purchase, and crop idling. These programs, in addition to the EWA, could magnify the effects described in Sections 14.2.4.1 - 14.2.4.3.

The Environmental Water Program would purchase water from different facilities than the EWA. Therefore, there is no potential for a cumulative decrease in surface water elevation in reservoirs resulting in a reduction of recreational opportunities. The Sacramento Valley Water Management Agreement, Dry Year Purchase Program, and Drought Risk Reduction Investment Program, as well as other potential water transfers, could purchase water from the same reservoirs as the EWA. Other programs in combination with the EWA that purchase water from the same agency could draw down reservoirs further than analyzed in this chapter. The additional water sold for other programs would reduce the Baseline Condition as described and could cause significant cumulative effects. A cumulative effect would only be significant if the combined actions were greater than the significance criteria (reduced recreational opportunities caused by a loss of boat ramps, reduction in fish or waterfowl populations, or decrease in river temperature). Therefore, although the EWA could contribute to a cumulative effect (e.g., a greater reduction in reservoir elevation), the EWA would not purchase water from an agency if the purchase would cause a cumulatively significant effect on recreation.

Actions such as groundwater substitution and crop idling in the Upstream from the Delta Region would potentially occur in four out of the five cumulative programs. These actions, in addition to the EWA, would create changes in the timing and quantity of water released from reservoirs, altering river flows. Water transfers from other agencies along the same rivers as in the EWA program area would also cause a cumulative effect on the change in river flow. The cumulative effect is not anticipated to cause a significant effect on recreation because recreational uses of the rivers, including fishing, swimming, and rafting, are possible within large fluctuations in flow. It is not anticipated that the river flow would change to such a level as to cause a cumulatively significant effect on recreation.

14.2.9.2 Export Service Area

Only the Drought Risk Reduction Investment Program and the CVPIA Water Acquisition Program operate in the Export Service Area. Effects from crop idling in this area are not associated with any decreases in recreational opportunity. Therefore, increased crop idling from various programs would not produce a cumulatively significant effect.

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